Soil Survey of Grey County

REPORT NO. 17 OF THE ONTARIO SOIL SURVEY

Ministry of Agriculture and Food
Ontario

Agriculture Canada
Research Branch
Direction générale de la recherche

Soil Survey of Grey County

By

J. E. GILLESPIE
Experimental Farms Service

and

N. R. RICHARDS
Ontario Agricultural College

GUELPH, ONTARIO

January, 1954

Reprinted January 1990

REPORT NO. 17 OF THE ONTARIO SOIL SURVEY

For other Counties and
Districts Survey Information,
Contact the
Consumer Information Centre,
Ontario Ministry of Agriculture and Food,
Main Floor,
801 Bay St.,
Toronto, Ontario
M7A 2B2

PREFACE

The soil survey of a county is essentially an inventory of the soils in that area. The characteristics of each soil unit are established and correlated with the soil of other counties. The soil units or types are delineated on a soil map at the scale of one inch to a mile. In the report the characteristics of each soil type are discussed including the various problems that may be encountered under cultivation. The soil types have been rated for their adaptability for producing the crops generally grown in the County and arranged in six classes: good crop land, good to fair crop land, fair crop land, fair to poor crop land, poor crop land and submarginal land.

The survey party spent three summers in the field traversing all the roads and road allowances by car when possible as well as making numerous traverses on foot. The survey of the Tank Range was completed in the spring of 1951.

This report is dedicated to the people of Grey County. May it serve as a useful source of information regarding the soils and soil problems of the County.

90-05296//

ACKNOWLEDGMENTS

The Dominion Department of Mines and Technical Surveys, Surveys and Mapping Branch, supplied the base maps.

The chemical analyses of permanent surface samples were done by Mr. R. D. O'Brien, while Mr. A. B. Olding assisted in the physical analyses.

Mr. A. B. Olding and Mr. K. M. Pretty assisted with the field work; Drs. A. Leahey and P. C. Stobbe critically reviewed the manuscript; and Miss G. V. Palmer assisted in the preparation of maps and charts.

TABLE OF CONTENTS

		Page
Preface		3
Part I.	General Description of Area	9
	Location and Area	9
	County Seat and Principal Towns	9
	Population and Racial Origin	9
	Transportation and Markets	10
Part II.	Factors Affecting the Formation of Grey County Soils	12
	Soil Parent Materials	12
	Natural Forest Vegetation	14
	Climate	16
	Relief	16
	Drainage	17
	Age	18
	Erosion	20
Part III.	The Classification and Description of Grey County Soils	21
	System of Classification	23
	Differentiation of Grey County Soils According to Soil Material and Drainage	24
	Harriston series	27
	Harkaway series	28
	Listowel series	31
	Wiarton series	32
	Parkhill series	34
	Osprey series	34
	Lily series	36
	Vincent series	38
	Kemble series	39
	Brookston series	40
	Dunedin series	41
	Morley series	42
	Leith series	42
	Saugeen series	43
	Elderslie series	44
	Chesley series	45
	Toledo series	45
	Pike Lake series	47

TABLE OF CONTENTS (Cont'd)

PART III. THE CLASSIFICATION AND DESCRIPTION OF GREY COUNTY SOILS (*Cont'd*) PAGE

Waterloo series ... 48
Donnybrook series ... 49
Burford series ... 50
Sargent series ... 51
Brighton Gravel series ... 52
Brisbane series ... 53
Gilford series ... 54
Brighton series ... 54
Fox series ... 55
Sullivan series ... 56
Tioga series ... 57
Tecumseth series ... 57
Brady series ... 58
Granby series ... 59
Breypen Land Type ... 60
Farmington series ... 61
Muck ... 61
Peat ... 61
Bottom Land ... 62
Marsh ... 62
Marl ... 62

PART IV. AGRICULTURE AND LAND USE ... 63
Early Settlement and Agricultural Development ... 63
Present Agriculture ... 63
Utilization and Management of Grey County Soils ... 66
Crop Adaptability Rating for Grey County Soils ... 70
Good Crop Land ... 71
Good to Fair Crop Land ... 72
Fair Crop Land ... 73
Fair to Poor Crop Land ... 74
Poor Crop Land ... 75
Submarginal Crop Land ... 76

PART V. ANALYTICAL DATA ... 77
MAP—Soil Map of Grey County in pocket back of report.

TABLES

No.		Page
1.	Trend of Population	9
2.	Mean Monthly Temperature for Grey County and Other Selected Points	15
3.	Mean Monthly Precipitation for Grey County and Other Selected Points	15
4.	Average Monthly and Annual Snowfall in Inches	15
5.	Present Land Use	64
6.	Present Use of Improved Land	64
7.	Acreage of Field Crops in Grey County	64
8.	Present Use of Unimproved Land	65
9.	Type and Value of Tree Fruit Production	65
10.	Type of Farm in Grey County	65
11.	Crop Adaptability Ratings for Good Crop Land	71
12.	Acreages of Good Crop Land	71
13.	Crop Adaptability Ratings for Good to Fair Crop Land	72
14.	Acreages of Good to Fair Crop Land	72
15.	Crop Adaptability Ratings for Fair Crop Land	73
16.	Acreages of Fair Crop Land	73
17.	Crop Adaptability Ratings for Fair to Poor Crop Land	74
18.	Acreages of Fair to Poor Crop Land	74
19.	Crop Adaptability Ratings for Poor Crop Land	75
20.	Acreages of Poor Crop Land	75
21.	Crop Adaptability Ratings for Submarginal Crop Land	76
22.	Acreages of Submarginal Crop Land	76
23.	Average Values for Chemical Composition of Surface Samples from Grey County	79

ILLUSTRATIONS

Figure		Page
1.	Outline Map of Ontario Showing Location of Grey County and Other Areas for Which Soil Maps have been Published	8
2.	Outline Map of Grey County Showing Location of Townships, Principal Towns, Highways and Railroads	11
3.	Outline Map of Grey County Showing Distribution of Soil Materials	13
4.	Relationship Between Water Need and Precipitation for the Durham Area in Grey County	17
5.	Outline Map of Grey County Showing Drainage Systems	18
6.	Outline Map of Grey County Showing Soil Drainage Conditions	19
7.	Silica-Alumina Molecular Ratios for the Three Profiles of the Osprey Series	23

FIG. 1—Outline map of Ontario showing location of Grey County and other areas for which soil maps have been published.

PART I

GENERAL DESCRIPTION OF THE AREA

Location and Area

Grey County is situated in the northern limits of Southwestern Ontario. Its northern boundary is on the shores of Georgian Bay, and it is bounded on the west by Bruce County, on the east by Simcoe and Dufferin Counties and on the south by Wellington County.

The total area of the County is 1,093,120 acres*. In the 1941 census 1,053,262 acres are classified as occupied land leaving 39,858 acres taken up by road allowances, crown land, etc.

County Seat and Principal Towns

Owen Sound, located on an arm of Georgian Bay, is the county seat of Grey County. It is the County's largest urban centre having a population of 14,002. Owen Sound is the hub of this tourist area and is a port of call for many lake steamers and freighters. It has a fine business section with excellent restaurants and hotels and an expanding industrial programme.

Hanover, with a population of 3,290*, is located on the boundary between Grey and Bruce. It is noted as a furniture manufacturing centre. Meaford, (population 2,662)*, is located on Georgian Bay at the mouth of the Bighead river and is a popular tourist centre famed for its fishing fleet. A large furniture factory, hardwood flooring factories and Co-Operative Fruit Growers Warehouse are also located in Meaford. The County Agricultural Representative's office is located at Markdale, a village in the centre of the County. Other important communities are Durham, Dundalk, Flesherton and Chatsworth.

Population and Racial Origin

The total population of Grey County is 57,160* of which approximately half live in the rural areas.

The breakdown in rural and urban population as shown in Table (1)* shows the decline in rural population from a peak of 48,225 in 1881 to 25,061 in 1941 with a steady increase in urban population except for one recession in 1921.

TABLE 1

	1871	1881	1891	1901	1911	1921	1931	1941
Rural	41,873	48,225	44,744	40,944	33,409	28,280	26,452	31,611
Urban	3,369	7,351	13,123	17,270	23,029	20,029	24,148	25,549

The people are dominantly of British origin, those of German being the only other group over one thousand in number.*

*Eighth Census of Canada, 1941.

Transportation and Markets

Grey County is linked with the more southern parts of the Province by several good highways. Highway No. 6 from Guelph traverses the length of the County to Owen Sound while highway No. 10 from Toronto cuts across the County to join with No. 6 at Chatsworth. Highway No. 26 from Owen Sound serves the tourist and fruit growing areas of Meaford and Thornbury, providing a Toronto outlet via Collingwood and Barrie.

Good rail service is offered from Owen Sound through Markdale, Flesherton, Dundalk and on to Toronto by the Canadian Pacific Railways. Another C.P.R. line runs from Hanover through Durham and Priceville joining the main line at Saugeen Junction. The Canadian National Railways operates a line from Owen Sound through Meaford and on to Collingwood. Another short C.N.R. line runs from Durham to Mount Forest.

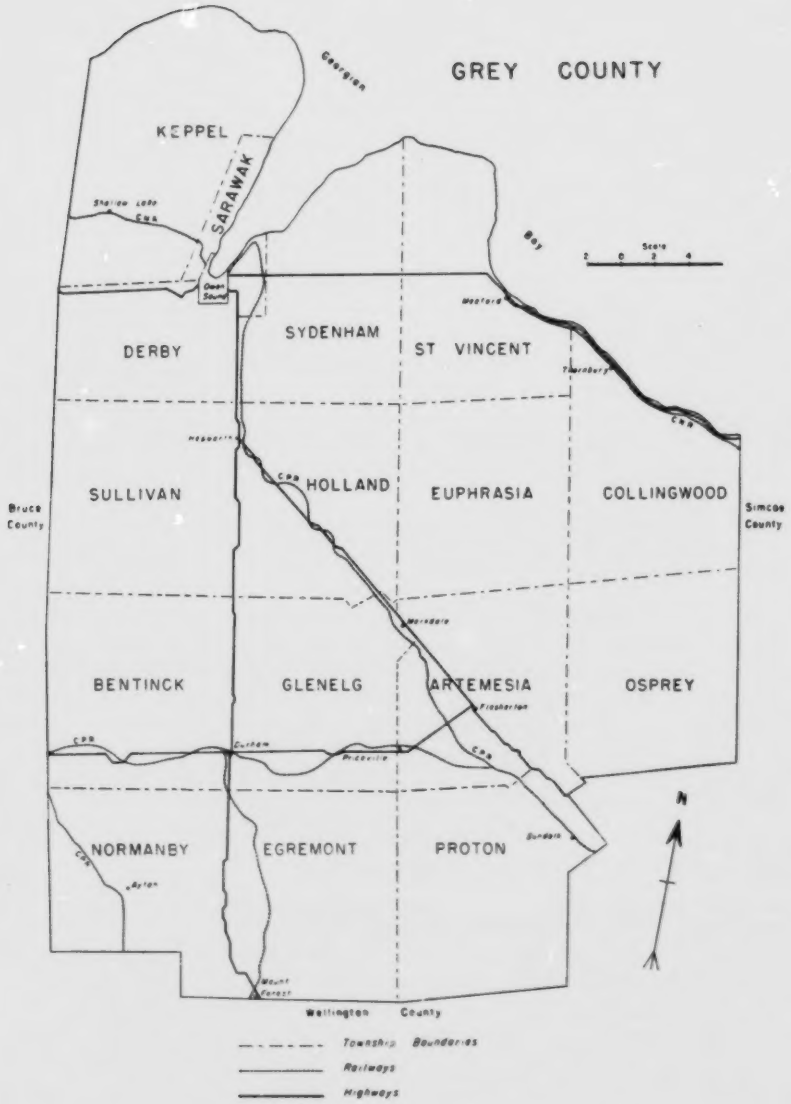


FIG. 2—Outline map of Grey County showing location of townships, principal towns, highways and railroads.

PART II

FACTORS AFFECTING THE FORMATION OF GREY COUNTY SOILS

When the last Wisconsin ice sheet melted and receded from this part of Ontario it left in its wake many types of raw soil materials. The ice ground up rock fragments and mixed them closely with pre-Wisconsin tills. In some parts of the County this material was deposited in level tracts, in others it assumed the appearance of knob and kettle topography and in others it was moulded into oval shaped hills or drumlins. During the thousands of years following glaciation many forces such as climate, topography, vegetation, time and organisms have exerted their influence on the upper layer of these materials and have brought about great differences in the physical and chemical composition of the surface layer of the raw material. These agents acting upon the various types of parent material left by the glacier give rise to many different soils which reflect in their profiles the cumulative effect of the foregoing factors.

Soil Parent Materials

The preponderance of soil materials was not carried great distances by the ice according to Putnam and Chapman*; however in many parts of Grey County the glacial drift is adulterated with rock fragments from formations beyond the borders. Much of the southern part of the County is underlain by the Guelph and Lockport formations while the drift above these formations is strongly influenced by the Bertie-Akron dolomite which had been carried into this area by the ice. The influence of this buff coloured dolomite increases from south to north in the County.

In the northwestern part of the County the glacial drift becomes quite thin and in large areas numerous rock outcrops occur.

The clay and clay loam till soils are found in a belt running east and west around Georgian Bay. These deposits are of two kinds: one representing the larger acreage is olive coloured calcareous till influenced by basal sandstone scraped off the Precambrian rocks and mixed with the calcareous materials during glaciation; a smaller area found in close association with the olive coloured till is influenced by the red shale of the Queenston formation.

The loamy till soil materials represent the largest area and are found throughout the County. These deposits are calcareous, strongly influenced by the Bertie-Akron dolomite which is closely mixed throughout the matrix.

The stonefree fine textured deposits occur in Sullivan Township. They are calcareous lacustrine silts and clays.

*Chapman, L. J. and Putnam, D. F. The Physiology of Southwestern Ontario. Scientific Agriculture, 24: 3.

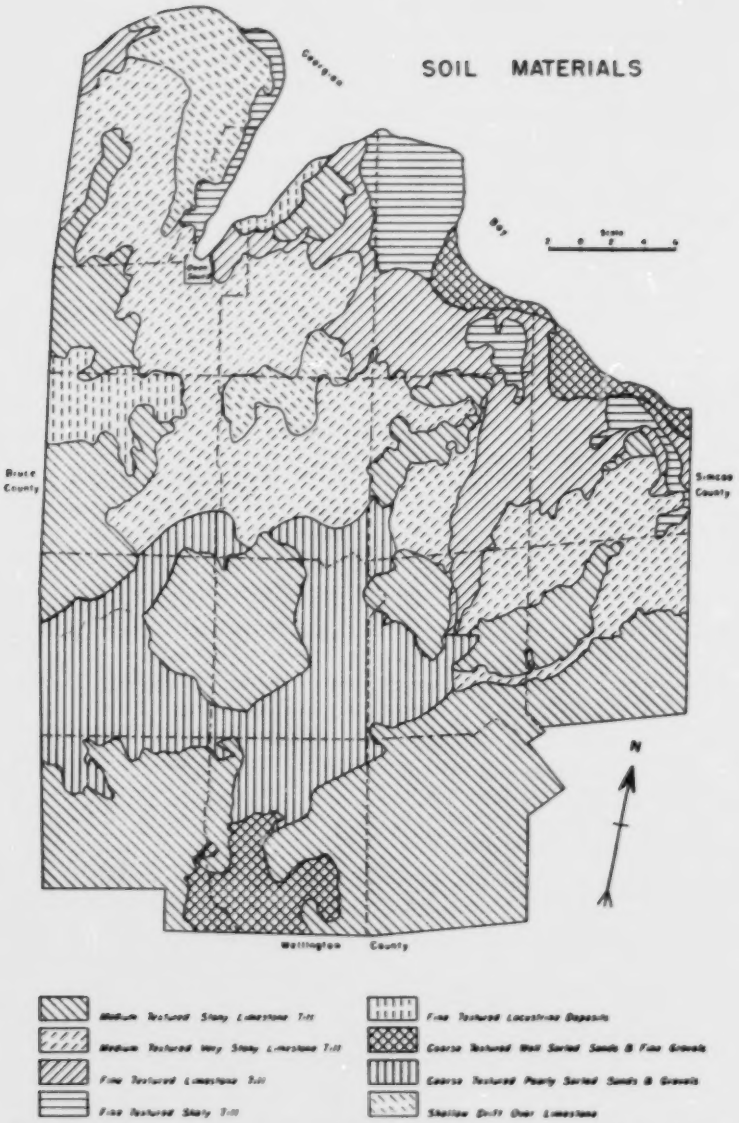


FIG. 3—Outline map of Grey County showing distribution of soil materials.

There is a large acreage of outwash materials in the Mount Forest, Durham, Hanover, and Meaford areas. They consist of well sorted sands and gravels.

The glacio-fluvial materials are poorly sorted outwash deposited in ice channels by streams flowing through the ice. They were left behind by the melting ice front and form snake-like ridges of various sizes on the landscape. These eskers are found throughout the lower half of the County.

Organic materials occur in many of the numerous old glacial river channels and depressional areas in the County. They are largely the remains of decayed trees and mosses. The chemical composition of the organic matter varies according to the state of decomposition and origin of the materials. They may be divided into two classes, peat and muck. The muck occurs in areas where the organic materials are in advanced stage of decomposition. The peat occurs where mosses have been the chief type of vegetation and have remained relatively undecomposed.

The distribution of the soil parent materials of Grey County is indicated in Figure 3.

NATURAL FOREST VEGETATION

The type of natural vegetation found in an area is dependent to a large degree on climatic and soil factors which combine to provide suitable environmental conditions for the growth of various species of plants. Once established, vegetation becomes a soil forming factor in its own right by exerting a considerable influence on soil development. The extent to which vegetation influences soil development varies with the type of vegetation. If climatic and soil factors combine to give an environment suitable for the development of a deciduous forest vegetation, the acid leaching process initiated by the leaf litter is not so intense as that occurring where coniferous vegetation has involved.

Halliday includes Grey County in the Huron-Ontario section of the Great Lakes-St. Lawrence Forest Region. He states that the prevailing species is broad-leaved but there is a reduction in the number of species. Sugar maple and beech are dominant, comprising about three-quarters of the forest. Certain associations of trees occur in dominant proportions on some soils more than on others and the following associations give an indication of the vegetation associated with the soils of the County.

Sugar Maple, Beech Association

This association is commonly found on the well drained limestone till soils of the County. Other trees occurring within this association are basswood, white elm, yellow birch, white ash, balsam, and an occasional pine.

Elm, Ash, White Cedar, Soft Maple Association

This association occurs on the imperfectly and poorly drained areas. The elm is found in large numbers on the large imperfectly drained area in Proton Township.

White and Red Pine Association

These coniferous species appear on the sandy soils and at one time were possibly the dominant species on such soils.

Blue Beech, Silver Maple, Tamarack, Slippery and Rock Elm, Black Ash Association

This association is found on particular sites such as river bottoms and swamps.

TABLE 2

MEAN MONTHLY TEMPERATURE FOR GREY COUNTY AND OTHER SELECTED POINTS

Station	Period of Record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Collingwood (Grey & Simcoe Boundary)	24	20	19	27	41	53	63	68	66	61	50	35	25	44
Owen Sound (Grey Co.)	54	20	19	27	40	52	61	67	65	59	48	35	25	43
Mount Forest (Grey & Wellington Bound.)	26	18	16	27	39	52	62	67	65	58	46	34	22	42
Guelph	55	20	19	28	42	53	63	68	66	59	47	36	24	44
Ottawa	52	11.8	12.7	24.7	41.7	54.9	64.6	68.9	66.3	58.5	46.2	32.4	17.3	41.6
Simcoe		23.0	23.5	31.2	43.2	54.6	64.6	69.3	67.3	61.6	49.8	38.4	27.5	46.2
Lindsay	57	16	16	26	41	54	64	68	66	59	46	34	21	42

TABLE 3

MEAN MONTHLY PRECIPITATION FOR GREY COUNTY AND OTHER SELECTED POINTS

Station	Period of Record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Eugenia (Grey Co.)	23	2.58	2.04	2.21	2.19	2.70	2.61	3.11	2.03	2.52	2.65	3.01	2.53	30.18
Owen Sound (Grey Co.)	54	4.00	2.95	2.40	2.02	2.55	2.67	3.05	2.59	3.03	3.17	3.34	4.21	35.98
Mount Forest (Grey & Wellington Bound.)	23	3.74	2.83	2.71	2.66	3.09	3.35	2.90	2.78	3.20	3.00	3.03	3.49	36.78
Guelph	55	2.35	1.79	1.88	2.30	2.80	2.89	3.24	2.87	2.67	2.39	2.48	1.99	29.65
Ottawa	52	2.98	2.40	2.65	2.32	2.74	3.39	3.67	3.00	2.94	2.68	2.63	2.84	34.24
Simcoe		3.51	2.64	2.93	3.20	2.51	2.81	2.92	2.59	3.00	2.68	3.31	2.05	25.15
Lindsay	57	2.94	2.39	2.42	2.24	2.85	2.91	3.07	2.81	3.06	2.68	2.86	2.60	32.83

TABLE 4

AVERAGE MONTHLY AND ANNUAL SNOWFALL IN INCHES

Station	Period of Record	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Eugenia		20.7	16.0	11.4	4.0	0.9	T			T	3.7	13.5	18.5	88.7
Owen Sound		34.2	25.2	14.6	4.2	0.4				T	1.7	12.1	33.8	126.2
Mount Forest		27.8	19.3	11.6	3.6	0.3				T	2.3	11.0	21.1	97.0

Climate

Climate is one of the primary soil forming factors. Temperature influences the rate of the weathering process of both organic and mineral materials. The amount of leaching is dependent upon the quantity of water percolating through the soil and this in turn is influenced by rainfall, humidity and frost-free period.

Climate is also important from a land use standpoint. The capabilities of soils for growing different crops are in part dependent on climatic factors.

Grey County is located in the Western Uplands as designated by Putnam and Chapman*. The mean annual temperature for this region is 41° to 44°F. It has an extreme temperature range of 145° from −43° to 102°F. The frost-free period is from 125 to 140 days and the growing season varies from 180 to 195 days, being shortest in the most elevated part of the region.

No climatic data are available for the central part of the County but a number of stations bordering the County will provide a general indication of the temperature and the precipitation for the area.

Tables 2, 3, and 4 indicate the climatic variability within the County. Owen Sound, enjoying the moderating influence of the waters of Georgian Bay, surpasses the other parts of the County in snowfall, but it will be noticed from the precipitation data that there is less rainfall at Owen Sound than at Mount Forest during April, May, June, August and September. Table 2 compares the mean monthly temperature and precipitation data of the stations in Grey County or vicinity with selected stations in other parts of the province.

The mean annual temperature of 44° at Collingwood reflects the moderating influence of Georgian Bay thus providing a suitable temperature for the growing of fruit and vegetables in the Meaford and Thornbury areas. This temperature is still much cooler than the mean annual temperature of 47° at Grimsby and 48° at Harrow, thus eliminating the growing of such delicate fruits as peaches. The mean annual temperature of 42° at Mount Forest indicates the colder temperature prevailing in the large areas of the County which are away from the moderating effects of the water. Lindsay, in Victoria County, has the same mean annual temperature as Mount Forest with slightly colder winter temperatures and correspondingly warmer summer temperatures. Figure 4 shows the relationship between water need and precipitation computed from data obtained at Durham in Grey County. This value originally developed by Thornthwaite has been applied to Ontario soils by Sanderson.* The graph indicates that a moisture deficiency occurs in this area early in July and continues until September. This is an important factor as it limits the growth of all crops.

Relief

The topography of Grey County is most variable. Proton Township is level to undulating, while Normanby, Egremont, St. Vincent, Bentinck, Sullivan and Sydenham are mainly smoothly rolling. Glenelg, Osprey, Collingwood, Holland and Derby have a dominantly irregular hilly topography. The relief in Keppel Township is broken by rocky cliffs and outcrops.

The altitude of the County is around 1,500 in the south rising to 1,700 in the central part and then dropping away to 800 in the north.

*Sanderson, Marie. The climates of Canada according to the new Thornthwaite classification. Sci, Agr. 28: 501-517. 1948.

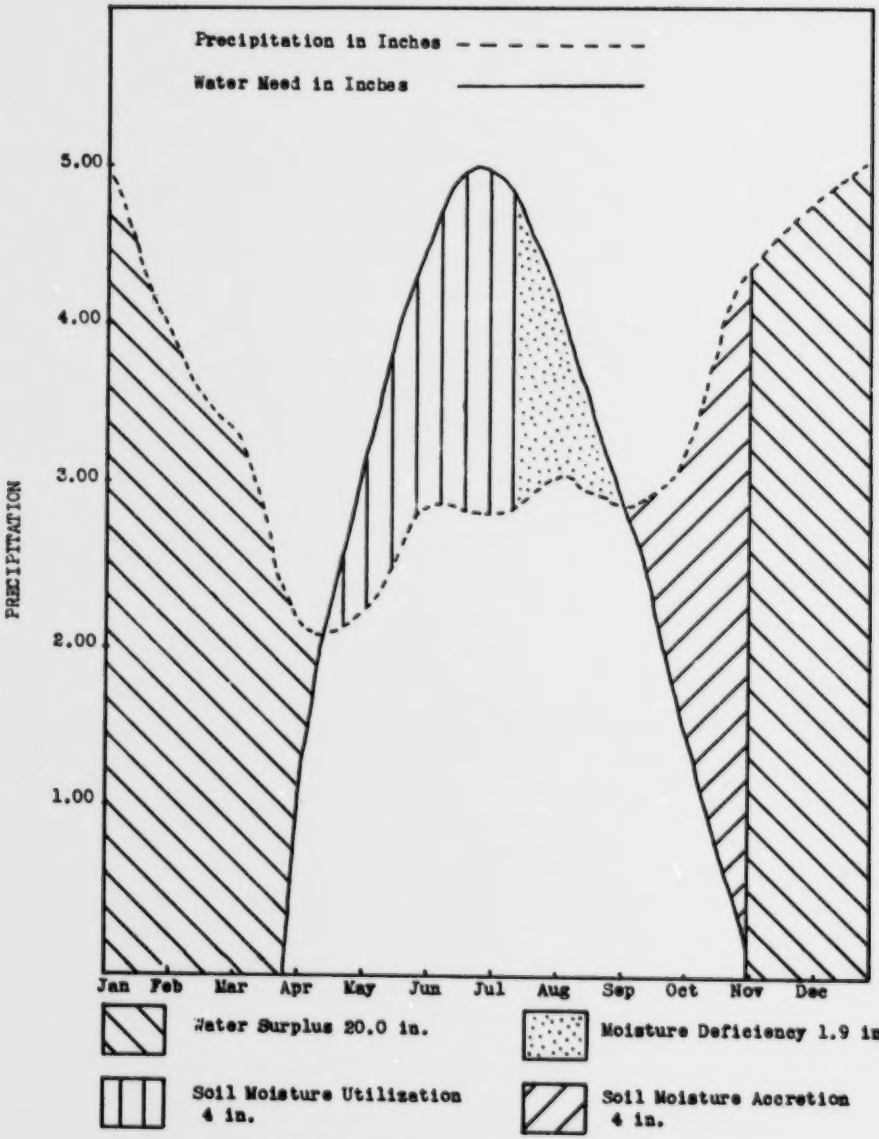


*FIG. 4—Relationship between water need and precipitation for the Durham area in Grey County.**

*Sanderson, Marie. The climates of Canada according to the new Thornthwaite classification. Sci, Agr. 28: 501-517. 1948.

Drainage

The Saugeen and Beatty rivers drain a large portion of the western half of the County into Lake Huron while the Beaver, Bighead and Pottawatomi rivers

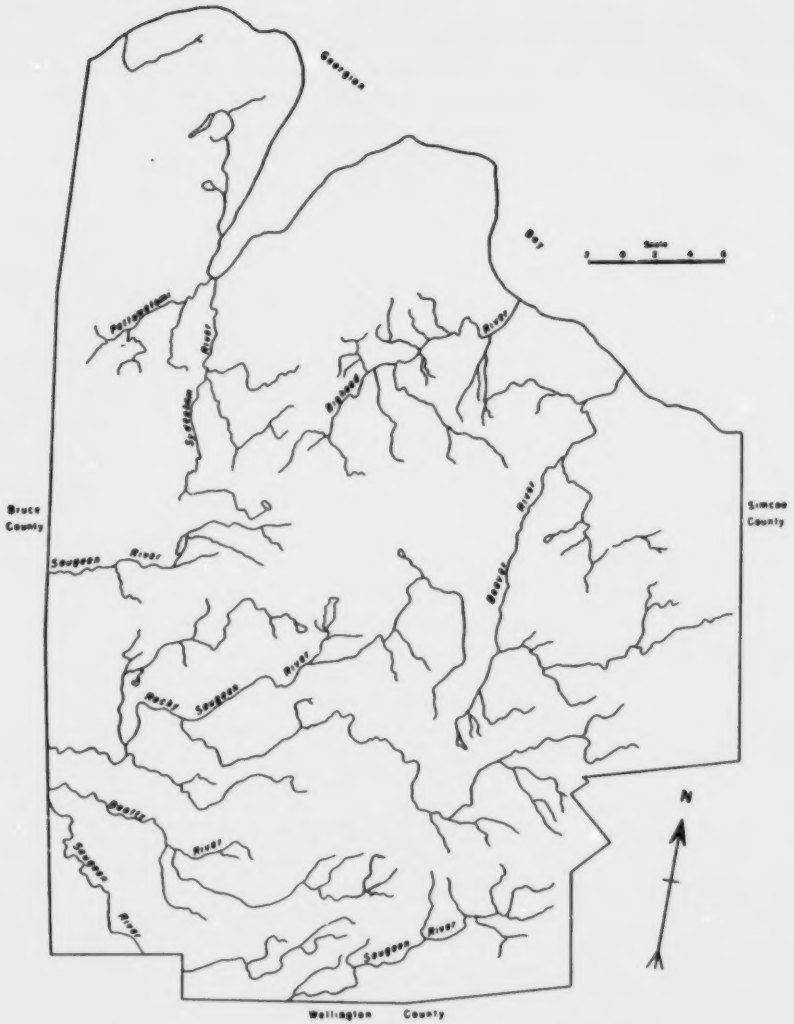


FIG. 5—Outline map of Grey County showing drainage systems.

drain the northern half into Georgian Bay. Proton and part of Egremont Townships are inadequately drained but the County as a whole is well drained.

Age

Grey County was covered by ice during the glacial period. The soil materials were deposited by the ice, or by glacial lakes and streams which existed during

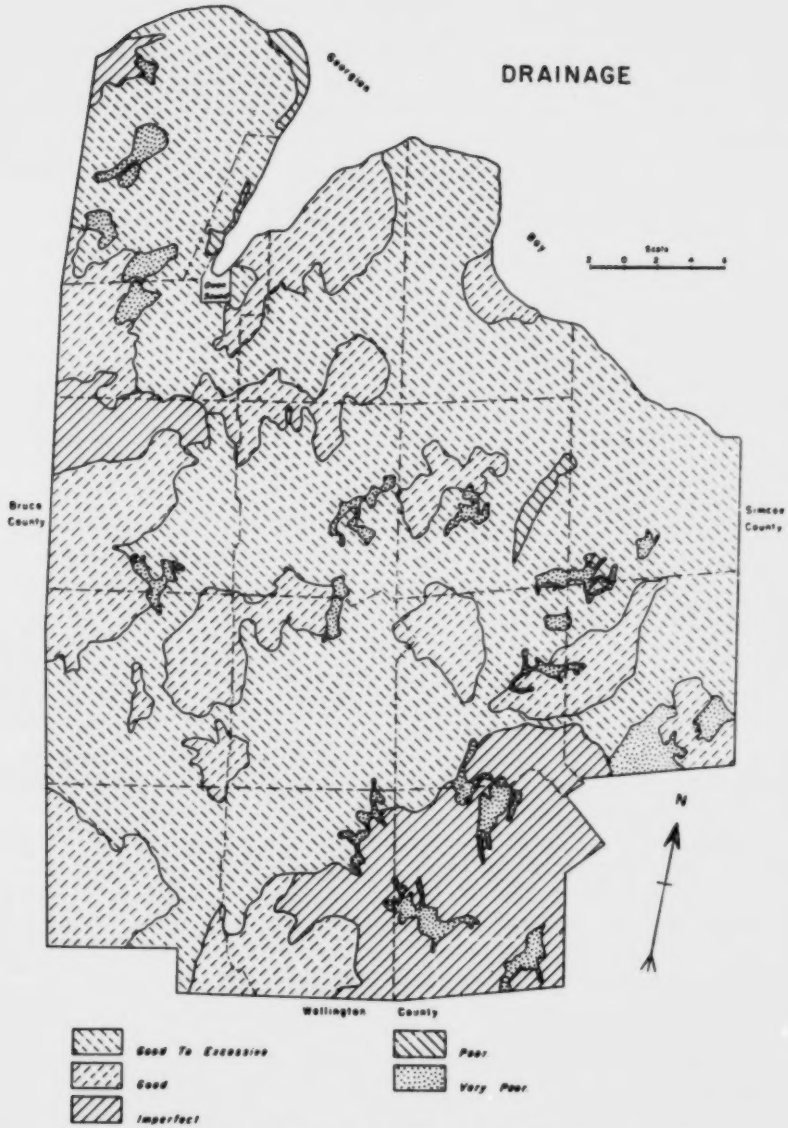


FIG. 6—Outline map of Grey County showing soil drainage conditions.

the retreat of the continental glacier. According to Putnam and Chapman* the southern part of the County was uncovered during the late Maumee and early Lake Wittlesey periods while the northern half was uncovered sometime later during the Schomberg and Peel pondings.

*Chapman, L. J. and Putnam, D. F. The Physiography of Southern Ontario. University of Toronto Press, 1951.

Erosion

A large area of Grey County is susceptible to erosion and accordingly has suffered considerable damage. This is a direct result of the strongly rolling to hilly topography of large areas of the County. The low slope Proton and Egremont areas are not so susceptible to erosion.

Wind erosion has resulted in blow-outs in the sandy soils in the Hepworth area.

PART III

THE CLASSIFICATION AND DESCRIPTION OF GREY COUNTY SOILS

The soils of Grey County are very diversified, largely due to such factors as differences in soil materials, texture, drainage, topography, and perhaps even climate. The interplay of soil forming factors such as vegetation and climate on the once raw glacial till and water-laid clay, sands or gravel usually results in a regional type of profile developing on the well drained locations. Such soils are referred to as Zonal soils.

In the southern half of the County the soils have developed under a temperate climate and under mixed hardwood vegetation into a Zonal soil in the well drained locations, having the characteristics of the Grey-Brown Podzolic Great Soil Group.

In the northern half of the County, climate, soil materials, age or a combination of the three have resulted in a much more reduced weathering, thus producing shallow profiles with characteristics similar to those of the Brown Forest Great Soil Group. However since there is evidence of translocation of clay and sesquioxides, they are considered to be Brown Forest–Grey-Brown Podzolic Intergrades.

The Grey-Brown Podzolic soils have developed on the calcareous tills, gravels and sands in the southern part of the County on well drained locations supporting a maple-beech vegetation. The horizons which reflect the soil forming processes in this part of the County are shown in the following description of a Harriston silt loam profile, the major Grey-Brown Podzolic soil occurring in the County.

A_0 – 1-0 inches: mat of partially decomposed organic matter.

A_1 – 0-4 inches: silt loam; very dark brown (10 YR 2/2); crumb structure; soft; very few stones; pH – 6.8.

A_{21} – 4-11 inches: silt loam; yellowish brown (10 YR 5/4); weakly platy; very few stones; pH – 6.7.

A_{22} – 11-17 inches: silt loam; light yellowish brown (10 YR 6/4); platy structure; few stones; pH – 6.6.

B_2 – 17-25 inches: clay loam; brown (7.5 YR 4/2); medium nuciform; sticky when wet; stoniness increases with depth; pH – 7.0.

C_1 – 25-29 inches: loam; yellowish brown (10 YR 5/4); structureless; moderately stony; calcareous.

C_2 – Pale brown (10 YR 6/3); loam till; moderately stony; calcareous.

The A_0 horizon composed of partly decomposed organic matter is thin and remains thin or may be absent because the organic matter as it decomposes becomes incorporated in the A_1 horizon below. The A_{21} horizon appears to be the beginnings of a Brown Podzolic B horizon. The parent material for this secondary process is the leached A_{22} horizon of the Grey-Brown Podzolic profile. The B_2 horizon is the zone of illuviation or accumulation and has been enriched with bases, sesquioxides and clay removed from the overlying horizons. The C_1 horizon is similar in texture and structure to the parent materials but has a slightly reddish tinge indicative of some sesquioxide intrusion from the B horizon.

The Brown Forest–Grey-Brown Podzolic Intergrade soils found on well drained locations in the northern half of the County have developed on highly calcareous parent materials including till soils, gravels, and sands. The natural vegetation is the maple, beech association.

The following profile description, which is representative of the type of weathering in this region, is that of an Osprey loam developed on high lime stony till materials.

A_0 – ½-0 inches; moss and decaying organic matter.

A_1 – 0-3 inches; loam; black (2.5 YR 2/0); crumb structure; friable; pH – 7.1.

B_1 – 3-8 inches; loam; dark brown (7.5 YR 3/2); weakly nuciform; friable; very few stones; pH – 7.0.

B_{21} – 8-12 inches; loam; dark reddish brown; (5 YR 3/3); nuciform structure; friable; very few stones; pH – 7.2.

B_{22} – 12-15 inches; clay loam; dark reddish brown; (5 YR 3/2); nuciform structure; friable; stony; pH – 7.5.

C_1 – 15-18 inches; clay loam; yellowish brown; (10 YR 5/6); clay loam; weakly nuciform; stony; pH – 8.0.

C_2 – Light yellowish brown (10 YR 6/4) loamy calcareous till; pH – 8.3.

The A_1 horizon has a high percentage of decomposed organic matter intimately mixed with the mineral fraction. The well defined A_2 horizon of the Grey-Brown Podzolic soils is absent; in its place, a brown layer which is called a B horizon is found below the A. Colour increases in intensity with depth to a maximum in the B_2 horizon, then decreases rapidly in the C_1 horizon. The structural aggregates increase in stability with depth to 15 inches where free carbonates are found.

Fig. 7 shows the silica to alumina molecular ratios for three profiles of the Osprey series. The profile described above is 1B in the figure.

It will be noted that there has been some accumulation of sesquioxides in the B2 horizons of all three profiles with profile 2A showing the least translocation. The ratios would indicate therefore, that these soils are in an early stage of Podzolization, but since the solum is thin, dominantly brown in colour, and the base status high in all profiles, these soils are considered Brown Forest–Grey-Brown Podzolic Intergrades.

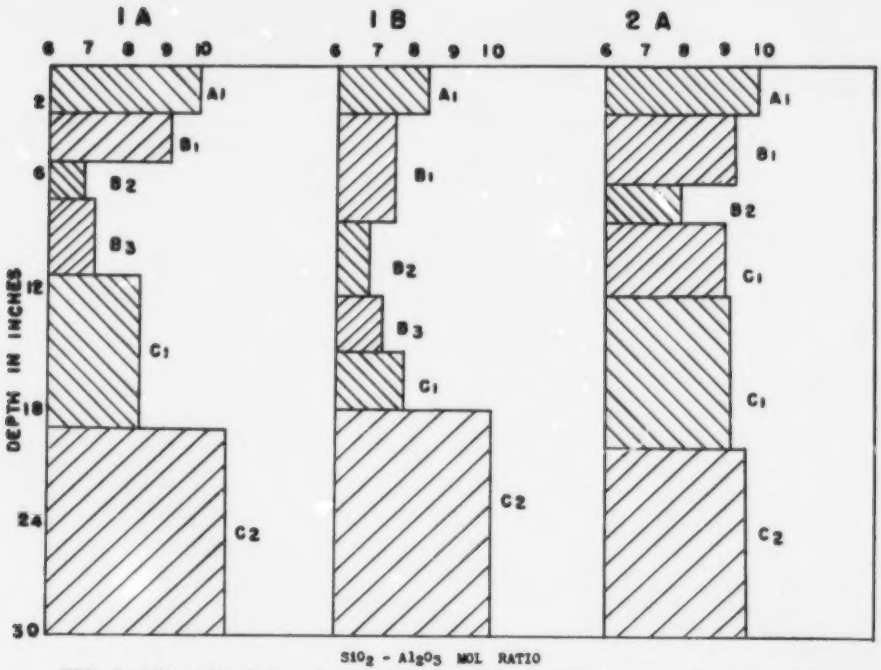


FIG. 7—Silica-alumina molecular ratios for three profiles of the Osprey series.

System of Classification

Soils are classified on the basis of differentiating characteristics which can be described and readily recognized in the various soils. Those categories commonly used in mapping are the catena, series, type and phase.

The catena includes all soils developed on similar parent materials in a given soil zone. The major differences between the soils of a catena are those due to variations in drainage conditions. In the detailed reconnaissance surveys, it is generally possible to describe and map three distinct soils within a catena, based on drainage conditions; the well drained, imperfectly drained, and poorly drained members. However, on some materials there may be only one or two different drainage members, while on other materials there may be more than three drainage members.

The soil series represents the individual drainage members of a catena, that is, the soils of a series have developed from similar parent materials under the same drainage conditions. All the soils of a series have a similar arrangement of horizons and their individual horizons have similar physical and chemical characteristics. However, soils of the same series may have slight variations in texture, particularly in the surface. The soil series is generally named after a town or other geographic place, where the soil was first mapped.

The soil type represents a subdivision of the series based on the texture of the surface soil. It is the most specific of any of the three units and it is the principal mapping unit. The soil type carries the series name and the texture designation of the surface soil. Many soil series consist of only a single soil type, while others may contain two or three types.

The phase is a subdivision of the soil type based on external soil characteristics that may be of great importance in land use, such as topography, stoniness, nearness of bedrock, etc.

The range of characteristics tolerated within a series and any marked variations from the average are discussed in the descriptions. Because of the relatively small scale of mapping, a unit area may contain, in addition to the dominant soil type, small areas of related soils.

DIFFERENTIATION OF GREY COUNTY SOILS ACCORDING TO SOIL MATERIALS AND DRAINAGE

I. Soil Developed from Limestone Till

A. Medium Textured Materials

			Acreages
(a)	Good Drainage		
1.	Harriston silt loam	G.B.P.	96,400
2.	Harriston loam	G.B.P.	35,400
3.	Harkaway silt loam	B.F.-G.B.P.	45,100
4.	Harkaway loam	B.F.-G.B.P.	49,700
5.	Harkaway loam-stony phase	B.F.-G.B.P.	5,600
6.	Harkaway silt loam-shallow phase	B.F.-G.B.P.	1,200
			233,400
(b)	Imperfect Drainage		
1.	Listowel silt loam	G.B.P.	72,700
2.	Listowel loam	G.B.P.	1,400
3.	Wiarton silt loam	B.F.	10,000
4.	Wiarton loam	B.F.	2,300
			86,400
(c)	Poor Drainage		
1.	Parkhill loam	D.G.G.	19,300
2.	Parkhill silt loam	D.G.G.	200
			19,500

B. Coarse Open Till Materials

(a)	Good Drainage		
1.	Osprey loam	B.F.-G.B.P.	156,000
2.	Osprey sandy loam	B.F.-G.B.P.	300
3.	Osprey loam-bouldery phase	B.F.-G.B.P.	8,500
			164,800
(b)	Poor Drainage		
1.	Lily loam	D.G.G.	7,900

C. Fine Textured Till

(a)	Good Drainage		
1.	Vincent silty clay loam	B.F.-G.B.P.	61,300
2.	Vincent silty clay loam-eroded phase	B.F.-G.B.P.	24,400
3.	Vincent silty clay loam-bouldery phase	B.F.-G.B.P.	100
			85,800
(b)	Imperfect Drainage		
1.	Kemble silty clay loam	B.F.	15,900
(c)	Poor Drainage		
1.	Brookston clay loam	D.G.G.	20,400
2.	Brookston clay loam-bouldery phase	D.G.G.	1,100
			21,500

D. Fine Textured Shaly Till

			Acreages
(a)	Good Drainage		
1.	Dunedin clay	G.B.P.-B.F.	26,900
2.	Dunedin clay-eroded phase	G.B.P.-B.F.	2,200
			29,100
(b)	Poor Drainage		
1.	Morley clay	D.G.G.	4,500
2.	Morley clay-bouldery phase	D.G.G.	400
			4,900

II. Soils Developed from Calcareous Lacustrine Materials

(a)	Good Drainage		
1.	Leith silty clay loam	G.B.P.-B.F.	4,300
2.	Saugeen silty clay loam	G.B.P.-B.F.	2,200
			6,500
(b)	Imperfect Drainage		
1.	Elderslie silty clay loam	B.F.	12,200
(c)	Poor Drainage		
1.	Chesley silty clay loam	D.G.G.	10,100
2.	Toledo clay loam	D.G.G.	4,100
			14,200

III. Soils Developed from Poorly Sorted Sands and Gravels

(a)	Good Drainage		
1.	Pike Lake loam	G.B.P.	111,900
2.	Waterloo sandy loam	G.B.P.	8,600
3.	Donnybrook sandy loam	B.F.-G.B.P.	31,600
			152,100

IV. Soils Developed from Calcareous Well Sorted Sands and Gravel

A. Coarse Gravelly Materials

(a)	Good Drainage		
1.	Burford loam	G.B.P.	3,900
2.	Sargent loam	B.F.-G.B.P.	12,700
3.	Brighton sandy loam	G.B.P.	400
4.	Brighton sandy loam over gravel phase	G.B.P.	700
			17,700
(b)	Imperfect Drainage		
1.	Brisbane loam	G.B.P.	2,400
(c)	Poor Drainage		
1.	Gilford loam	D.G.G.	4,700

B. Coarse Sandy Materials

(a)	Good Drainage		
1.	Brighton sand	G.B.P.	10,400
2.	Fox sandy loam	G.B.P.	1,200
3.	Sullivan sand	B.F.	7,400
4.	Tioga sandy loam	G.B.P.-P.	1,000
			20,000
(b)	Imperfect Drainage		
1.	Tecumseth sandy loam	G.B.P.	2,500
2.	Brady sandy loam	G.B.P.	2,300
			4,800
(c)	Poor Drainage		
1.	Granby sand	D.G.G.	3,500

V. Soils Developed from Shallow Drift Over Limestone Bedrock

	Variable Drainage		Acreages
1.	Breypen Land type	B.F.	41,900
2.	Farmington loam	G.B.P.	2,100
			44,000

VI. Soils Developed on Organic Materials

	Very Poor Drainage		
1.	Muck	Bog	98,900
2.	Peat	Bog	500
			99,400

VII. Soils Developed from Alluvial Materials Along Stream Courses

1.	Bottom land	Alluvial	40,400
2.	Marsh	Alluvial	400
3.	Marl	Alluvial	1,600
			42,400

Key to Abbreviations

G.B.P. —Grey-Brown Podzolic
B.F. —Brown Forest
B.F.-G.B.P.—Brown Forest—Grey-Brown Podzolic Intergrade
G.B.P.-B.F.—Grey-Brown Podzolic-Brown Forest Intergrade
G.B.P.-P. —Grey-Brown Podzolic—Podzol Intergrade
D.G.G. —Dark Grey Gleisolic

DESCRIPTION OF GREY COUNTY SOILS

I. SOILS DEVELOPED FROM LIMESTONE TILL

A. MEDIUM TEXTURED MATERIALS.

The soils in this group are the Harriston and Harkaway catenas. They have developed in medium textured, moderately stony, calcareous materials.

Many parts of Grey County are drumlinized; this view of a drumlin was taken near Chatsworth.

(a) Good Drainage

Harriston Silt Loam (96,400 acres)

Harriston silt loam is a well drained soil having the profile characteristics of the Grey-Brown Podzolic Soils.

The following is a description of a Harriston silt loam profile which is representative of the soil type as found in Grey County.

A_1 – 0-3 inches; silt loam; very dark brown (10 YR 2/2); granular structure; very friable; few stones; pH – 6.8.

A_{21} – 3-15 inches; silt loam; yellowish brown (10 YR 5/4); weakly platy structure; very friable; few stones; pH – 6.6.

A_{22} – 15-18 inches; silt loam; light yellowish brown (10 YR 6/4); platy structure; friable when moist; few stones; pH – 6.4.

B_2 – 18-26 inches; clay loam; brown (7.5 YR 4/2); medium nuciform structure; firm consistence; numerous small stones in lower part of horizon; pH – 7.0.

C – Loam; light yellowish brown (10 YR 6/4); moderately stony; calcareous; pH – 8.2.

The topography is quite variable. Much of the area mapped as Harriston is drumlinized. These drumlins have regular moderate to steep slopes. In undrumlinized areas the topography is irregular moderately sloping.

The stoniness varies from slightly stony to moderately stony. The natural vegetation is hardwood, maple, birch, basswood, white ash and elm.

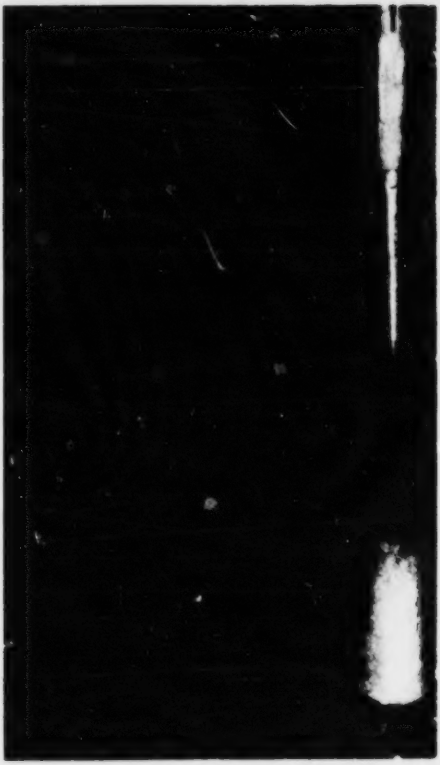
Agriculture

The Harriston silt loam is suitable for the production of a wide range of crops normally grown in the County. General farming is the usual practice on this soil with dual-purpose Shorthorns being much in evidence. It is a good soil especially on the lower slopes for the production of corn for ensilage and root crops. On the steeper slopes erosion is very serious and some control measures such as longer rotations containing grass, contour plowing, and strip cropping are required.

Harriston silt loam is easier and more economical to work than the fine textured clay soils. It should respond to applications of phosphorus and potash.

Harriston Loam (35,400 acres)

The profile of the Harriston loam differs from the silt loam in having more stone fragments throughout the solum and a thinner A_2 horizon. It has more surface stone and a slightly lower inherent fertility than the Harriston silt loam. Under cultivation the only differences in management would be slightly



HARRISTON SILT LOAM

The Harriston soils are members of the Grey-Brown Podzolic Great Soil Group. The depth to B_2 is more than 14".

higher rates of fertilizer applications and heavier applications of barnyard manure.

Harkaway Silt Loam (45,100 acres)

The Harkaway soils appear to have developed on parent materials similar to that of the Harriston series but the dominant profiles resemble the Brown Forest soils more than the Grey-Brown Podzolic soils.

Profile (virgin)

A_1 – 0-4 inches; silt loam; very dark brown (10 YR 2/2); fine granular structure; very friable; pH – 6.9.

B_1 – 4-9 inches; silt loam; brown (7.5 YR 4/4); medium nuciform structure; friable; moderate stony; pH – 6.7.

B_2 – 9-15 inches; silt loam; yellowish brown (10 YR 5/4); medium nuciform structure; firm; pH – 7.2.

C – Loamy till; pale brown (10 YR 6/3); calcareous.

Courtesy of Dept. of Public Relations, O.A.C., Guelph.

Strip cropping is an effective and economical method for halting erosion on steep slopes.

This being an intergrade soil there is a fairly wide range in profile characteristics. The topography varies from smooth gently sloping to smooth steeply sloping and in many places is drumlinized. Stoniness ranges from moderately stony to very stony. The natural vegetation is the maple, beech association with a sprinkling of ash, hemlock and birch.

Agriculture

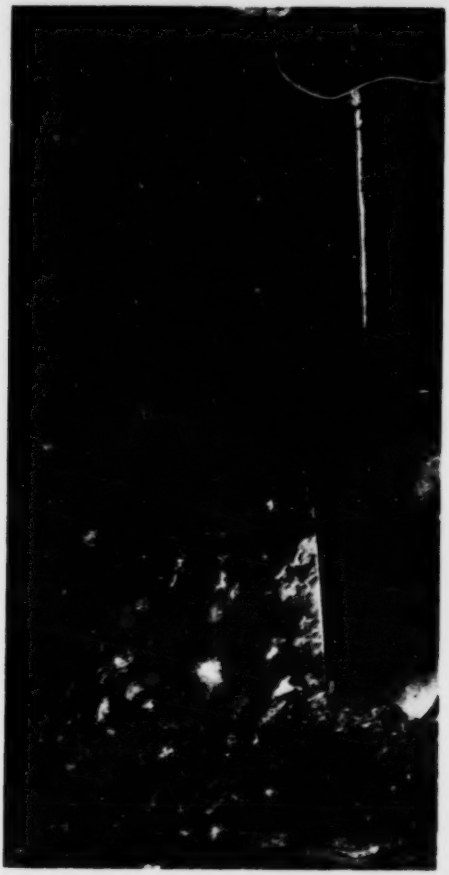
On the moderately stony and lower slopes, good crops of clover, alfalfa and timothy are grown and the main crop is oats.

On the very stony phases cultivation becomes more difficult, and unless the stones are removed from fields it is almost impossible to cultivate the soils.

The moderately shallow solum and friable nature of the soil makes good farm management imperative. Intertilled crops should be kept at a minimum.

Harkaway Loam (49,700 acres)

The Harkaway loam is quite similar to the Harkaway silt loam in all its morphological and genetic characteristics with the exception of surface texture. Thus land use and farm management practices are similar for both types.



HARKAWAY LOAM

This is a picture of a Harkaway profile. Note the absence of a well defined B_2 horizon and boulders in the fence row.

Harkaway Loam—Stony Phase (5,600 acres)

A large area in the vicinity of the small communities of Harkaway and Goring was mapped as Harkaway loam, stony phase. This phase is similar in profile characteristics to the other members of the Harkaway series except in stoniness. Some farms in this area have been cleared of surface boulders with the expense of a large amount of labour and are presently under successful cultivation. Recently heavy machinery has been used in clearing operations. This latter method, while effective, is expensive.

Harkaway Silt Loam—Shallow Phase (1,200 acres)

This phase is mapped in Sydenham Township and occurs where bedrock appears within about two feet of the surface. Profile characteristics are similar to those of the Harkaway series. Chief limitations of this phase come from the relatively shallow drift which increases the risk of droughts. Farm management should be directed towards means of minimizing such risks. Shallow phases such as these should be restricted to hay and pasture as much as possible. Depending on the season it is possible to grow fair to good crops of cereal grains. Early maturing varieties are desirable.

(*b*) *Imperfect Drainage*

Listowel Silt Loam (72,700 acres)

The Listowel silt loam is the imperfectly drained member of the Harriston catena. Like the Harriston, the Listowel silt loam has developed on medium textured dolomitic till materials. Very large acreages of the Listowel soils are mapped in Proton and Egremont Townships where the topography is gently undulating. Smaller areas are mapped in close association with the Harriston silt loam. The colour and textural horizons are poorly defined and the profile exhibits the characteristics of a weakly developed Grey-Brown Podzolic soil. The following profile description is representative for the type.

A_1 — 0-5 inches; silt loam; very dark grey (7.5 YR 3/0); granular structure; very friable; few stones; pH — 7.0.

A_2 — 5-10 inches; loam; yellowish brown (10 YR 5/6); slightly mottled; platy structure; hard when dry; pH — 6.8.

B_2 — 10-15 inches; clay loam; dark grey-brown (10 YR 4/2); mottled; nuciform structure; friable; stony in lower part of horizon; pH — 7.2.

C_1 — 15-17 inches; loam; light yellowish brown; calcareous.

C_2 — Loam; light yellowish brown (10 YR 6/4); calcareous till; pH — 8.0.

The gently undulating topography provides imperfect external drainage. There has been very little erosion on the type. The tree growth consists of elm, soft maple, and beech.

Agriculture

A large percentage of this type is under cultivation. Provision for improvement of drainage is found in the numerous open drains. The range in crops which can be grown successfully on the Listowel silt loam is more restricted than on the Harriston. Timothy, oats and buckwheat are the more dependable crops.

LISTOWEL SILT LOAM

The deep dark A_1 horizon and weakly developed B horizon are characteristic of this imperfectly drained soil.

Alfalfa is not tolerant of imperfect drainage. The organic matter content is good and the type is well supplied with lime. Farm income appears to be below average and there is a decided need for improved drainage. It should respond to tile drainage which should not be too costly where open ditches are available for outlets.

Listowel Loam (1,400 acres)

This soil type varies only in surface texture from the Listowel silt loam. Agricultural practices and crop adaptability are similar to those of the Listowel silt loam.

Wiarton Silt Loam (10,000 acres)

The Wiarton silt loam is the imperfectly drained member of the Harkaway catena. These soils have developed on medium textured yellowish brown till and display the characteristics of the Brown Forest soils.

Under favourable climatic conditions heavy crops of hay and oats are produced on the Listowel silt loam.

Profile (cultivated)

Ac – 0-7 inches; silt loam; very dark grey-brown (10 YR 3/2); small granular structure; friable; pH – 7.2.

B – 7-12 inches; loam; brown (10 YR 5/3); mottled; medium nuciform; firm; pH – 7.4.

C – Loam; pale brown (10 YR 6/3); calcareous till; mottled; pH – 8.0.

There is very little variation in profile characteristics manifested but a shallow phase of Wiarton silt loam which varies from 14-20" over bedrock, is mapped around Kemble. Occasionally alluvial materials may be intermixed with stony till materials. The topography is mostly smooth very gently sloping. The series is moderately stony. The natural vegetation is soft maple and elm.

Agriculture

Drainage restricts the range of crops that can be successfully grown on this series. However, the soil will produce good crops of timothy, alsike and red clover, oats and buckwheat. Intertilled crops such as potatoes, turnips and corn should do fairly well. The Wiarton series should respond to tile drainage.

Wiarton Loam (2,300 acres)

Differing from the Wiarton silt loam only in texture, the profile characteristics are similar. Management and cultural practices are similar to those recommended for the Wiarton silt loam.

(c) Poor Drainage

Parkhill Loam (19,300 acres)

Parkhill Silt Loam (200 acres)

Parkhill loam and silt loam are mapped in association with the Listowel and Harriston soils and usually occur on level to depressional areas. They are the poorly drained members of the Harriston catena. The profile has the characteristics associated with the Dark Grey Gleisolic Soils and a description of a typical profile follows.

Ac – 0-6 inches; loam or silt loam; very dark brown (10 YR 2/2); granular structure; friable consistency; few stones; pH – 7.0.

Bg – 6-24 inches; loam; greyish brown (10 YR 5/1) massive structure; friable; mottled; moderately stony; pH – 7.2.

C – Loam or clay loam; grey calcareous till; moderately stony; pH – 8.0.

The depressional nature of the topography coupled with run-off from the higher surrounding soils results in poor external drainage. The ground water table lies close to the surface for a considerable part of the year. The greater part of the Parkhill loam is either in woodlot or permanent pasture. Trees commonly found on this type are elm, soft maple, balsam, cedar, white ash, and blue beech. If a suitable outlet is available, it should be practical to tile drain this type because it has the potentialities of a good soil. In its natural poorly drained condition the Parkhill loam is a late soil in the spring and therefore only fair crops of hay and oats can be expected.

B. COARSE OPEN TILL MATERIALS

The soils developed on the coarse open till materials are the members of the Osprey catena.

(a) Good Drainage

Osprey Loam (156,000 acres)

The Osprey soils have developed from a light buff coloured stony till of dolomitic origin. Many limestone boulders dot the surface and a large number of these buff coloured rock fragments are to be found in the matrix.

The Osprey series is the well to excessively drained member of the Osprey catena; the imperfectly drained soils mapped in association with the Osprey occur in very small areas and have been correlated with other catenas. The poorly drained member of the catena has been mapped as Lily loam.

The Osprey Soils are considered as intergrades between the Brown Forest and Grey-Brown Podzolic Great Soil Group, the former being dominant.

Profile (virgin)

A_0 – ¼-0 inches; moss and decaying organic matter.

A_1 – 0-2 inches; loam; black (2.5 YR N/2); crumb structure; pH – 7.0.

B_1 – 2-8 inches; loam; dark brown (7.5 YR (3/2); weakly nuciform; very few stones; pH – 6.6.

B_{21} – 8-12 inches; loam; dark reddish brown (5 YR 3/3); nuciform structure; friable; very few stones; pH – 7.2.

B_{22} – 12-15 inches; clay loam; dark reddish brown (5 YR 3/2); nuciform structure; friable; stony; free carbonates; pH – 7.4.

C_1 – 15-18 inches; clay loam; yellowish brown (10 YR 5/6); weakly nuciform; stony; pH – 8.0.

C_2 – Loamy till; light yellowish brown (10 YR 6/4); pH – 8.2.

Depth of solum varies from 8-18 inches. Free carbonates are usually found in the surface horizons of the shallower profiles. The topography ranges from irregular moderately sloping to irregular very steeply sloping with the largest percentage falling in the intermediate group; irregular steeply sloping. The

OSPREY LOAM

The lower slope groups of the Osprey are under cultivation. Clearing such land of boulders was a major undertaking performed by the early settlers.

stoniness varies from stony to very stony, the former being the most common. The natural vegetation on the Osprey soils is the maple, beech association.

Agriculture

Large acreages of this soil series are being used only for pasture, while other extensive areas remain in woodlot. The characteristics restricting the use of the Osprey series for growing crops include unfavourable topography and stoniness. The shallow solum enhances the erosion problem and on the steeper slopes of the cleared areas practically no profile remains.

Small tracts of land cleared of trees and boulders are under cultivation. In such cases good crops of hay and pasture are obtained. Good to fair crops of oats and buckwheat can be grown in such areas. However in appraising the suitability of the Osprey for crop production the overall characteristics of this series must be considered.

Osprey Sandy Loam (300 acres)

The Osprey sandy loam differs from the Osprey loam mainly in texture. It may be slightly less fertile and retain less moisture than the loam soil.

Osprey Loam—Bouldery Phase (8,500 acres)

This phase is similar to the Osprey loam in profile characteristics and topography but is excessively bouldery. This characteristic limits its use for the production of any cultivated crops. It has some value as natural pasture land.

(b) Poor Drainage

Lily Loam (7,900 acres)

The Lily loam is developed on coarse textured stony calcareous till materials. It is mapped as the poorly drained member of the Osprey catena and it has the

The knob and kettle type of topography as found on the Osprey soils results in the existence of a large number of small lakes.

general characteristics of the Dark Grey Gleisolic Soils. It is found in small tracts over all the County with the exception of the most southerly townships.

The following is a profile description.

Ac – 0-6 inches; loam; black (10 YR 2/1); crumb to granular structure; pH – 7.1.

Bg – 6-18 inches; loam; greyish brown (10 YR 5/2); mottled; weak blocky structure; firm consistency; pH – 7.2.

C – Loam; greyish brown calcareous till; very stony with numerous boulders.

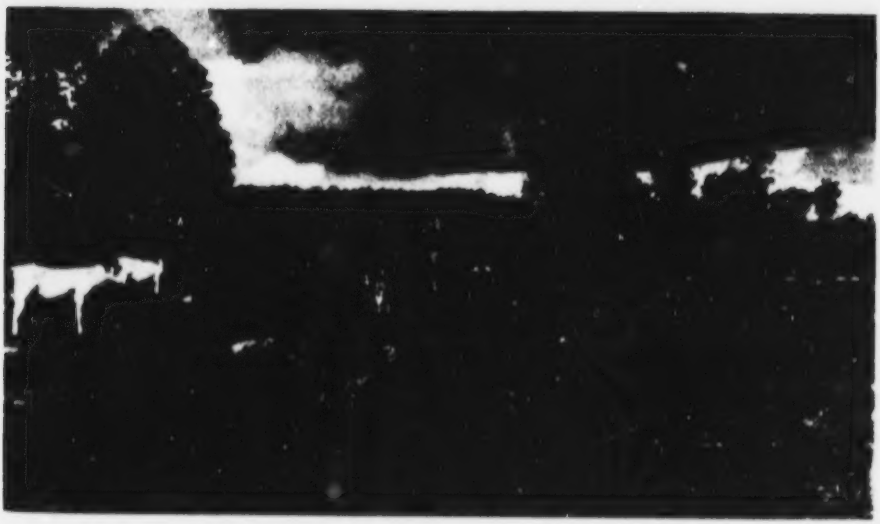
The topography is depressional and the water table is at or near the surface for the greater part of the year. The vegetation is chiefly elm, cedar, soft maple, yellow birch, and balsam.

Agriculture

The use of this soil type for cultivation is seriously restricted by the poor drainage and stony and bouldery nature of the surface. The cost of preparing this land for cultivation would be in most cases prohibitive. It would appear to serve its most useful purpose as pasture or woodlot.

C. FINE TEXTURED TILL

These soils are slightly to moderately stony silty clay, and clay soils. The soils described under this heading are the members of the Vincent catena.



LILY LOAM

Cattle pasturing on poorly drained stony till soils mapped in association with the Osprey series.

(a) Good Drainage

Vincent Silty Clay Loam (61,300 acres)

The Vincent series has developed on fine textured greyish brown till which is often compacted. The Vincent series is the well drained member of the Vincent catena; the imperfectly drained member is the Kemble and the poorly drained member is the Brookston series. The well drained soils exhibit the characteristics of the Brown Forest–Grey-Brown Podzolic Intergrades.

Profile (cultivated)

A_1 – 0-4 inches; clay loam; very dark greyish brown (10 YR 3/3); medium granular structure; friable; a few small stones; pH – 7.0.

B_1 – 4-10 inches; clay loam; yellowish brown (10 YR 5/4); fine to medium nuciform structure; firm consistency; very few stones; pH – 6.8.

B_2 – 10-24 inches; clay; brown (7.5 YR 4/4); medium blocky; hard consistency; plastic when wet; very few stones; pH – 7.2.

C – Light brown (7.5 YR 6/4); clay till; stony containing fragments of sandstone, shale and other igneous rocks; pH – 8.0.

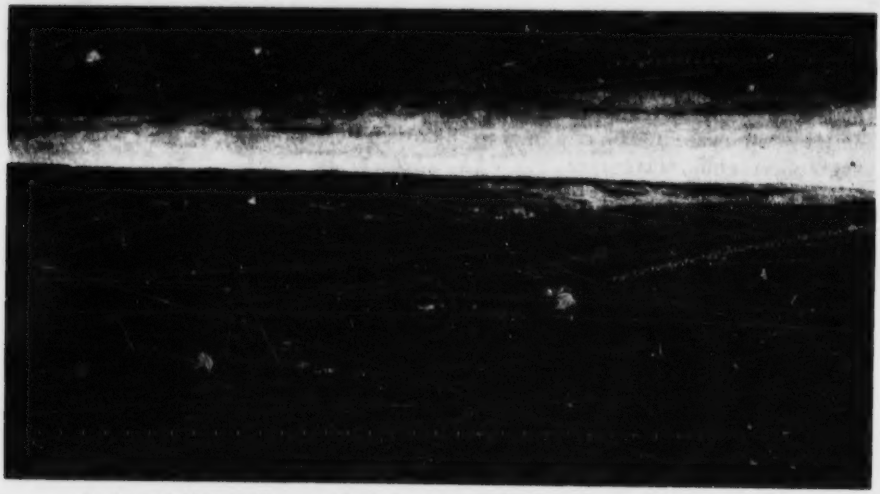
Some variation of colour occurs within the series. North of Bognor the Vincent has throughout the profile a somewhat pinker cast which is noticeable especially in the B horizon. Some profiles exhibit better defined Grey-Brown Podzolic characteristics than others. The topography varies from smooth gently sloping to smooth very steeply sloping, the greater acreage occurring in the smooth moderately sloping to smooth steeply sloping groups. The stoniness varies from slightly stony to moderately stony. The natural vegetation is dominantly hard maple and beech.

Agriculture

Although low in readily soluble potash, the presence of a fairly good supply of other nutrients in this soil has produced a vigorous and successful agriculture. General farming is prevalent with excellent crops of alfalfa, clover, oats and some fall wheat being produced. A very large acreage of flax is grown for seed, while alfalfa, red clover, ladino clover and rape seed are produced in considerable quantities.

At the lower end of the Beaver Valley the slope becomes too excessive for cultivation. Land use in this area is largely restricted to pasture and woodlot.

The long slopes associated with this series makes erosion a serious hazard but these same long slopes are ideally suited for the application of conservation measures such as terracing, strip cropping, or rotations which will leave such fields under sod for long periods.



A view of the southern end of the Beaver Valley. Note the steep slopes.

Vincent Silty Clay Loam—Eroded Phase (24,400 acres)

This phase is mapped principally along the steep slopes of the Beaver Valley. The cleared slopes have been badly eroded exposing the parent materials. Of necessity much of the area has been retired to permanent pasture. The whole lower end of the valley from Heathcote to Flesherton has great possibilities for development into a provincial park.

Vincent Silty Clay Loam—Bouldery Phase (100 acres)

A boulder beach in the Meaford area was mapped as a bouldery phase of the Vincent. Such areas may be used as permanent pasture.

(b) Imperfect Drainage

Kemble Silty Clay Loam (15,900 acres)

The Kemble soils developed on fine textured greyish brown till. This series is the imperfectly drained member of the Vincent catena, the Vincent being the well drained member and the Brookston the poorly drained member. The profile is mottled beneath the surface, but exhibits sufficiently well developed Brown Forest characteristics to be included in that Great Soil Group.

Profile (cultivated)

Ac — 0-6 inches; silty clay loam; very dark grey-brown (10 YR 3/2); small to medium nuciform; very friable; pH — 7.2.

B — 6-12 inches; clay; brown (7.5 YR 4/4); medium nuciform structure; hard; plastic when wet, mottled; pH — 7.3.

C — Silty clay loam; light brown (7.5 YR 6/4); fragmental structure; extremely hard; plastic when wet; pH — 7.8.

Variations in thickness of surface and B horizons do occur within the series. Profiles exhibiting Grey-Brown characteristics occur less frequently than in the well drained series. The topography ranges from smooth very gently sloping to smooth gently sloping. The soils are usually only slightly stony. Occasional small areas varying from moderately stony to very stony occur but these are too small to delineate on the one inch to the one mile scale of mapping. The natural vegetation is elm, soft maple.

Agriculture

Fair to good crops of spring grain and hay can be grown on this soil type. It produces excellent crops of clover. Areas which are too stony for cultivation provide good pasture.

This series will respond to tile drainage but it would not be advisable to tile the stonier phases.

(c) Poor Drainage

Brookston Clay Loam (20,400 acres)

Brookston clay loam has been mapped as the poorly drained member of the Vincent catena. Although mapped in other counties as a member of the Huron catena, the morphological characteristics are not sufficiently different to warrant setting up of a new soil series. The Brookston is developed on a gritty calcareous clay till. The profile displays the characteristics of the Dark Grey Gleisolic Great Soil Group. This type has been mapped in the northern part of the County especially in Sydenham and St. Vincent Townships. The following profile description is representative of the type.

Ac – 0-7 inches; clay loam; very dark grey (10 YR 3/1); granular structure; friable; pH – 7.2.

Bg – 7-24 inches; clay; greyish brown (10 YR 5/2); mottled; massive structure; hard; plastic when wet; pH – 7.1.

C – Clay; pale brown (10 YR 6/3); gritty calcareous till; pH – 7.6.

Brookston clay loam is mapped in association with the Vincent and Kemble soils. It is found on level to slightly depressional areas where because of poor external and internal drainage, a poor medium for the growth of most farm crops is provided. A large acreage of this type is used as permanent pasture and some as woodlot. Excessive moisture limits crop growth and if drainage is improved the relatively rich nutrient reserve of this soil is available for the production of crops normally grown in the area.

Brookston Clay Loam—Bouldery Phase (1,100 acres)

This phase has the general profile characteristics of the Brookston clay loam but is boulder strewn. The boulders are a residue of an old boulder beach reducing land use to pasture or woodlot.

D. FINE TEXTURED SHALY TILL

In the northern part of the County soils have been mapped which have developed on shallow shaly till materials underlain by red shale containing bands of grey shale. The Dunedin catena containing two catenary members are mapped in this area.

(*d*) *Good Drainage*

Dunedin Clay (26,900 acres)

The Dunedin series developed on residual red shale of the Queenston formation. This series is the well drained member of the Dunedin catena. The only other catenary member mapped is the poorly drained Morley series. The Dunedin series may be considered as an intergrade between the Grey-Brown Podzolic and Brown Forest Great Soil Groups the former being the dominant type of profile.

Profile (cultivated)

A_1 – 0-3 inches; clay; very dark greyish brown (2.5 YR 3/2); fine granular structure; friable; pH – 6.8.

A_2 – 3-9 inches; clay; grey-brown (10 YR 5/2); fine nuciform structure; hard consistency; pH – 6.6.

B_2 – 9-15 inches; clay; reddish brown (5 YR 4/3); medium blocky; hard; plastic when wet; pH – 7.0.

C – Clay; dark reddish brown (5 YR 3/4); with layers of more resistant grey shale; calcareous.

The profile generally displays the characteristics of a shallow Grey-Brown Podzolic Soil. A considerable amount of leaching has removed sesquioxides from the surface horizons with subsequent accumulation in the B horizon. The topography varies from smooth moderately sloping to irregular steeply sloping chiefly because of dissection by stream courses. The type is essentially stonefree. Natural vegetation is mostly hardwoods.

Agriculture

Erosion is severe on the steeper slopes. South of Meaford on the rolling topography there exists a thriving specialized agriculture based on the growing of flax, rape and clover for seed.

The fine texture possessed by the Dunedin clay makes good soil management imperative. The organic matter content of the surface layer should be increased by incorporation of second cut hay crops, strawy manure, and all crop residues. The rewards of such practices are improved soil structure, greater ease in cultivation and better yields.

Dunedin Clay-Eroded Phase (2,200 acres)

The eroded phase has been dissected by stream courses and the resulting steep slopes make it obligatory to keep this phase out of cultivation.

(b) Poor Drainage

Morley Clay (4,500 acres)

The Morley series is the poorly drained member of the Dunedin catena. No imperfectly drained member has been mapped in the County. The parent material is a red shaly clay. This series is classified as a member of the Dark Grey Gleisolic Great Soils Group.

Profile (cultivated)

A_1 – 0-5 inches; clay; dark grey (7.5 YR 4/0); weakly blocky; pH – 6.6.

G – 5-15 inches; clay; grey-brown (10 YR 4/2) interfaces; red interior (10 YR 3/3); large prismatic aggregates; some carbonates within the aggregates; hard; plastic when wet; pH – 7.2.

C – Dark reddish brown (5 YR 3/4); stonefree clay; carbonates.

There is some variation in depth of surface and overall depth of solum representing conditions varying from somewhat poorly drained to very poorly drained. The topography varies from smooth level to smooth very gently sloping. It is essentially stonefree but some areas are very stony. Large pine stumps are evident but perhaps much of the natural vegetation was elm, soft maple and ash.

Agriculture

The Morley soils in Grey County are being used as permanent pasture. Drainage conditions, coupled to the very unsatisfactory structure, present a serious obstacle in the path of further development. Pine stumps dotted over the large acreage of this series in North Keppel are an indication that the area has not been extensively cultivated. The poor structure results from a high clay content, poor drainage and low organic matter.

Morley Clay–Bouldery Phase (400 acres)

Certain areas in Sarawak Township correlated with the Morley are boulder strewn and mapped as a bouldery phase.

II. SOILS DEVELOPED ON CALCAREOUS LACUSTRINE MATERIALS

The soils developed on calcareous lacustrine materials in Grey County are the Saugeen catena containing three catenary members, and the Leith catena containing only the well drained member. In addition a small acreage of poorly drained stonefree clay soils was mapped as Toledo clay loam.

(d) Good Drainage

Leith Silty Clay Loam (4,300 acres)

The Leith series has developed from lacustrine materials. It is a well drained soil and the profile displays the characteristics of the Brown Forest–Grey-Brown Podzolic Intergrade.

Profile

A_1 – 0-4 inches; silty clay loam; dark brown (7.5 YR 3/0); fine to medium nuciform structure; very friable consistency; pH – 6.4.

A_2 – 4-10 inches; silty clay loam; dark grey-brown (10 YR 4/2); fine nuciform structure; very friable consistency; pH – 6.2.

B_2 – 10-24 inches; silty clay loam; dark brown (7.5 YR 3/2); medium blocky structure; hard consistency; plastic when wet; pH – 6.4.

C_1 – 24-30 inches; silty clay; dark grey-brown (10 YR 4/2); weak blocky structure; friable consistency; pH – 6.6.

C_2 – Silty clay; dark brown; (10 YR 4/3); calcareous.

The depth to the underlying calcareous material is somewhat variable. The topography varies from smooth moderately sloping to irregular steeply sloping. It is essentially stonefree. The natural vegetation is the maple, beech association.

Agriculture

Some of the most productive farms in the County are located on the lower slope group of the Leith series. Pure bred herds of Holsteins, Jerseys, Shorthorns and Herefords are found in this area. Excellent crops are grown; heavy yields of alfalfa and red clover were noticed during the course of the survey; spring grain crops and fall wheat are also grown advantageously.

Erosion is a serious hazard on the steeper slope groups of this series. Such slopes should be kept under cover in long term hay or pasture rotations.

Saugeen Silty Clay Loam (2,200 acres)

The Saugeen silty clay loam was developed on stonefree calcareous lacustrine materials. It is the well drained member of the Saugeen catena. Other catenary members are the imperfectly drained Elderslie and the poorly drained Chesley. The Saugeen soils are considered as being Grey-Brown Podzolic–Brown Forest, Intergrades. This soil is mapped in Sullivan Township along the Boundary between Grey and Bruce Counties.

The following is a profile description.

Ac – 0-6 inches; grey (10 YR 5/1); silty clay loam; fine nuciform structure; friable; stonefree; pH – 6.0.

B_1 – 6-9 inches; yellowish brown (10 YR 5/4); silty clay loam; medium nuciform structure; friable; stonefree; pH – 6.0.

B_2 – 9-17 inches; brown (10 YR 5/3); silty clay; medium to large blocky; hard; plastic when wet; stonefree; pH – 6.7.

C – Clay; pale brown (10 YR 6/3); calcareous stonefree; pH – 7.6.

The topography is moderately sloping and vegetation found on the Saugeen includes maple, beech and hemlock. The fineness of the soil particles combined with slope make the soil type susceptible to erosion.

Agriculture

The Saugeen soils have the advantages of being well drained, stone-free and have a high level of fertility. They will produce good yields of cereal grains and hay crops generally grown in the area, but should be used sparingly for intertilled crops because of the erosion hazard.

(*b*) ***Imperfect Drainage***

Elderslie Silty Clay Loam (12,200 acres)

The Elderslie series has developed on silty clay lacustrine materials. These soils are the imperfectly drained members of the Saugeen catena and may be considered as intergrades between the Grey-Brown Podzolic and Brown Forest Great Soil Groups, the former being dominant.

Profile (cultivated)

A_1 – 0-4 inches; silty clay loam; dark grey (7.5 YR 4/0); fine to medium nuciform; friable; pH – 6.1.

B_1 – 4-7 inches; silty clay loam; dark grey-brown (10 YR 3/2); medium nuciform; firm; mottled; pH – 6.6.

B_2 – 7-12 inches; clay loam; very dark brown (10 YR 2/2); medium to coarse blocky structure; very hard; plastic when wet; pH – 6.9.

C – Pale brown (10 YR 6/3); silty clay; calcareous; stonefree.

The profile may vary from a thin Grey-Brown Podzolic to a Brown Forest type of profile. The topography is smooth very gently sloping. Stoniness varies from essentially stonefree to moderately stony. In the latter case the stoniness appears to be a surface condition only. The natural vegetation is elm, ash, and soft maple.

Agriculture

Drainage is the only unfavourable factor that can be set against this series and crop response will vary from season to season. These soils will produce good to fair yields of crops such as timothy, alsike, oats, and buckwheat. The Elderslie soils may be used advantageously for improved pasture.

This series should respond to tile drainage.

(c) Poor Drainage

Chesley Silty Clay Loam (10,100 acres)

The Chesley soils are developed on fine textured calcareous lacustrine materials. Chesley silty clay loam is the poorly drained member of the Saugeen catena and exhibits the characteristics of the Dark Grey Gleisolic Great Soil Group. It is mapped in Sullivan Township. The following is a profile description.

A_1 – 0-5 inches; silty clay loam; very dark grey (10 YR 3/1); fine nuciform structure; firm consistency; stonefree; pH – 7.0.

G – 5-15 inches; silty clay; grey (10 YR 6/2); mottled; massive structure; hard; very plastic when wet; stonefree; pH – 7.2.

C – Clay; grey (10 YR 6/2); mottled; blocky structure; hard; very plastic consistency when wet; stonefree; pH – 8.0.

The topography is level to very gently sloping and the vegetation is mainly elm, ash and cedar.

Agriculture

Unless drainage is improved the agricultural potentialities of the Chesley soils are restricted to permanent pasture and some hay crops. Chesley is well supplied with plant nutrients and if drainage outlets are readily obtainable improvement in drainage should be practical and give beneficial results.

Toledo Clay Loam (4,100 acres)

The Toledo clay loam is developed on calcareous stonefree lacustrine materials. It is the poorly drained member of the Brantford catena and is mapped in small acreages in Sullivan and Sarawak Townships. It belongs to the Dark Grey Gleisolic Great Soil Group. The following is a profile description.

Ac – 0-6 inches; clay loam; very dark grey (10 YR 3/3); granular structure; pH – 7.0.

G – 6-24 inches; clay; grey; mottled; light yellowish brown (10 YR 6/4); medium to large blocky structure; hard; plastic when wet; breaking into smaller aggregates; pH – 7.2.

C – Clay; mottled; grey (10 YR 5/1); stonefree; calcareous.

TOLEDO CLAY

This soil has a high percentage of clay which greatly restricts the movement of water. Note the accumulation of organic matter in the surface and the large structural aggregation in the parent material.

The topography is nearly level and the drainage is poor. Vegetation consists of elm, ash, soft maple.

Agriculture

Toledo clay loam has a high fertility level but poor drainage greatly restricts its capacity to grow farm crops. Under natural drainage conditions it will grow some hay crops and provide pasture for livestock. In favourable seasons it will produce good to fair crops of oats, buckwheat, and flax.

It should respond to tile drainage and become a heavy producer of general farm crops.

III. SOILS DEVELOPED FROM POORLY SORTED SANDS AND GRAVELS

The soils discussed in this section are the Pike Lake, Waterloo, and Donnybrook series.

(a) Good Drainage

Pike Lake Loam (111,900 acres)

The Pike Lake loam has developed on calcareous gravelly materials containing pockets of till. It is well to excessively drained and large acreages of this type are found in the southern half of the County. In the depressional areas associated with the Pike Lake soils the parent materials have been subjected to more water action and consist of well sorted gravelly materials. These soils have been mapped as the imperfectly drained Brisbane loam and the poorly drained Gilford loam which are catenary members of the Burford catena. The Pike Lake loam exhibits the characteristics generally associated with the Grey-Brown Podzolic Great Soil Group. The following profile description is representative of the type.

The parent materials of the Pike Lake soils consist of a gravelly till, as shown in this picture.

A_0 – 2-0 inches; decaying organic matter, twigs etc.

A_1 – 0-3 inches; loam; dark grey-brown (10 YR 4/2); crumb structure; very friable; pH – 7.0.

A_2 – 3-11 inches; sandy loam: yellowish brown (10 YR 5/4); weakly platy; stony; pH – 6.2.

B_2 – 11-16 inches; clay loam; reddish brown (5 YR 4/3); weakly nuciform; stony; pH – 7.0.

C – Loam to sandy loam calcareous till and gravelly materials.

Although most of the original forest has been removed existing woodlots are an indication that the original vegetation most probably was the maple, beech association. The topography is irregular moderate to steeply sloping. Sheet erosion has been very severe on areas which have been cultivated.

The drainage of the Pike Lake loam is good to excessive. The coarseness of the materials induces rapid percolation and the lack of organic matter and fine materials within the solum limits the storage capacity for water.

Agriculture

The steep topography and the stony nature of the material provide such hazards to cultivation that at present most of the soil type is used only as permanent pasture or woodlot. Some of the lower slope phases of the Pike Lake loam are under cultivation and grow fair crops of hay including alfalfa and grain crops such as oats, buckwheat, and rye. The main limiting factors of such cultivated areas are low fertility and droughtiness in conjunction with erosion and stoniness.

The rather high moisture deficiency rating for the County and the low moisture holding capacity of this type tend to depreciate its value as permanent pasture. The brown dried up pastures during July and August are indicative of the deficiency of moisture.

It appears that much of the Pike Lake loam would be achieving its maximum land use efficiency if it were replanted to trees.

Waterloo Sandy Loam (8,600 acres)

The Waterloo sandy loam has developed on poorly sorted calcareous sandy materials. The series is the well to excessively drained member of the Waterloo catena and is the only catenary member mapped. The profile characteristics are those of the Grey-Brown Podzolic Soils. It is mapped in relatively small areas throughout the southern half of the County. The following is a profile description which is representative of the type.

A_1 – 0-3 inches; sandy loam; very dark grey; (10 YR 3/1); crumb structure; pH – 6.5.

A_{21} – 3-10 inches; sandy loam; light yellowish brown; (10 YR 6/4); platy structure; pH – 6.3.

A_{22} – 10-14 inches; sandy loam; very pale brown; (10 YR 7/3); weak platy structure; pH – 6.3.

B_2 – 14-16 inches; loam; brown; (10 YR 5/3); weakly nuciform; firm; sticky; pH – 7.0.

C – Sand, grey (10 YR 7/2); calcareous; pH – 8.0.

Under virgin conditions secondary profiles which have the characteristics of Podzol Soils are developing near the surface. The natural vegetation is maple, beech with a number of conifers present. The topography is irregular steeply sloping to very steeply sloping.

Agriculture

While some local areas have sufficiently smooth slopes to permit cultivation, the Waterloo sandy loam in Grey County is not generally adaptable to cultivation. It is subject to severe erosion by both wind and water, and this hazard, coupled with low fertility makes it impracticable for the growing of crops. Local cultivated areas on the smoother slopes may produce fair crops of hay and grain if the fertility level is improved. Potatoes should do well on such low slope areas. However, the type as a whole is too steep for successful cultivation, provides only fair pasture and should be reforested.

Donnybrook Sandy Loam (31,600 acres)

The Donnybrook soils have developed on calcareous poorly sorted gravelly materials. The series is in the well to excessively drained member of the Donnybrook catena; the imperfectly and poorly drained members usually occur on low slope groups and are correlated with the Burford catena. The Donnybrook series displays the characteristics of the Grey-Brown Podzolic Soils.

Profile (virgin)

A_0 – ½-0 inches; moss and decomposing organic materials.

A_1 – 0-3 inches; sandy loam; dark grey-brown; (10 YR 4/2); crumb structure; friable; pH – 7.0.

A_{21} – 3-12 inches; sandy loam; yellowish brown; (10 YR 5/6); weak platy structure; few stones; variable depth; pH – 6.8.

A_{22} – 12-16 inches; sand; pale brown (10 YR 6/3); weak platy structure; pH – 6.4.

B – 16-20 inches; sandy loam; dark brown; (10 YR 4/3); medium nuciform structure; pH – 7.2.

C – Very pale brown (10 YR 7/3); calcareous unsorted gravel; pH – 8.0.

There are differences in depth of profile depending upon the degree of slope at the point of profile examination. The topography varies from irregular moderately sloping to irregular very steeply sloping. The stoniness varies from slightly stony to very stony. The natural vegetation is the maple, beech association.

Agriculture

A large proportion of the Donnybrook soils are either in permanent pasture or woodlot. However, some general farming is sustained on the lower slope groups. This series has the advantage of being an early soil but it has many disadvantages. It has a low inherent fertility, low moisture holding capacity and is susceptible to erosion. It will grow fair crops of hay, especially deep rooted plants, such as alfalfa. Fair crops of oats and fair to good crops of rye and buckwheat may be grown.

Numerous gravel ridges (eskers) are to be found in the County. These eskers are mapped as Donnybrook sandy loam.

The numerous small eskers which are mapped as Donnybrook sandy loams are suitable only for permanent pasture or woodlot.

IV. SOILS DEVELOPED FROM CALCAREOUS WELL SORTED SANDS AND GRAVELS

A. COARSE GRAVELLY MATERIALS

The well sorted coarse gravelly materials were deposited as river terraces. The soils developed on these materials and mapped in Grey County include the Burford, Sargent and Brighton catena.

(a) Good Drainage

Burford Loam (3,900 acres)

This soil type has developed on well sorted gravelly calcareous materials. The Burford loam is the well drained member of the Burford catena and it has the profile characteristics associated with the Grey-Brown Podzolic Soils. Other catenary members are the imperfectly drained Brisbane and the poorly drained Gilford loam. It is mapped in considerable acreages in the southern part of the County especially in the vicinity of Mount Forest.

The profile characteristics of this type are as follows:

A_1 – 0.3 inches; loam; very dark grey (7.5 YR 3/0); granular structure; very few stones; pH – 6.8.

A_2 – 3-10 inches; loam; yellowish brown (10 YR 5/4); weakly platy; friable; few stones; pH – 6.5.

B_2 – 10-15 inches; clay loam; dark reddish brown (5 YR 3/3); nuciform structure; sticky; hard; pH – 7.1.

C – Calcareous well sorted gravel.

The topography of the Burford loam is nearly level to gently undulating. The open gravelly parent materials provide rapid internal drainage, which offsets the lack of surface drainage.

Most of the Burford loam has been cleared; however, the small woodlots remaining are dominantly composed of hard maple and beech.

Agriculture

The nearly level topography, loamy texture, and freedom from large stones are attractive assets of the Burford loam; liabilities are somewhat low natural fertility, and the numerous cobbles which appear on the surface and which require frequent picking. The coarse gravelly soil materials have a low moisture holding capacity and in dry periods the Burford soils are somewhat droughty.

General farming is the usual agricultural practice on these soils and they are adaptable to growing a wide range of crops. They will produce fair to good yields of all crops normally grown in the area including alfalfa, clover, fall wheat and spring grains. It is suited to the growing of such crops as potatoes and turnips.

Sargent Loam (12,700 acres)

This series has developed on well sorted gravelly materials with a shallow overburden of finer materials. It may be considered as an intergrade between the Brown Forest and Grey-Brown Podzolic Great Soil Groups, the former being the more dominant. It occurs on well drained areas. There is such a small acreage of imperfectly drained gravel mapped in association with the Sargent that a new series has not been set up and any such areas are mapped as Brisbane loam. The poorly drained member of the catena is the Gilford series.

Profile (virgin)

A_1 – 0-3 inches; loam; very dark brown (10 YR 2/2); granular structure; pH – 7.1.

B_1 – 3-6 inches; loam; yellow-brown (10 YR 5/4); coarse granular structure; uneven boundary; gravelly; pH – 7.0.

B_2 – 6-11 inches; clay loam; dark brown (10 YR 4-3); small to medium nuciform; friable; gravelly; carbonates; pH – 7.4.

C – Yellow-brown (10 YR 5/4); calcareous; well sorted gravel.

There is considerable variation in profile characteristics ranging from Brown Forest to shallow Grey-Brown Podzolic.

The topography generally is smooth, very gently sloping but occasionally it may be irregular, very gently sloping. The soil is moderately stony. Cobbles are numerous and frequent picking will eliminate much of the nuisance they cause to cultivation. Because of the shallow solum and open gravelly parent materials internal drainage is quite rapid. The natural vegetation is the maple, beech association.

Agriculture

This series produces fair to good crops of timothy, clover, and alfalfa hay, fall wheat, and oats. Some potatoes are grown but not so extensively as on the Burford series. This soil dries and warms up quickly permitting early spring cultivation.

It has a lower fertility rating than the medium till soils and tends to be a droughty soil. The latter handicap can be somewhat lessened by the incorporation of organic matter into the soil. This effect can be achieved by plowing under green maturing crops or strawy manure with nitrogen.

Brighton Sandy Loam (400 acres)

The Brighton sandy loam mapped in the county is developed on a gravel beach of the Lake Whittlesey post glacial period. It is a well drained soil. The following profile description is characteristic of the type.

Ac — 0-5 inches; sandy loam; dark greyish brown (10 YR 4/2); crumb structure; very friable; few stones; pH — 6.8.

A_2 — 5-10 inches; sandy loam; brown (10 YR 5/3); weak platy structure; very friable; few stones; pH — 6.6.

B — 10-12 inches; loam; reddish brown (5 YR 4/3); nuciform structure; friable; stony; pH — 7.2.

C — Well sorted calcareous gravel.

The topography assumes the shape of a small low ridge with regular, gently sloping sides.

Agriculture

This beach line has become incorporated into the farm rotations and produces satisfactory crops. It is good potato land. At a number of points gravel pits have been developed.

Brighton Sand over Gravel Phase (700 acres)

This phase, in close association with the Brighton sand, comprises a gravel terrace having about a foot of sandy overburden. At the present time it is being used both for general farming and fruit growing. Farm management practices are similar to those applicable to the Brighton sandy loam.

Courtesy of Dept. of Public Relations, O.A.C., Guelph.

Return of adequate organic matter to the soil is a practice which will maintain or improve soil structure, and put "drought resistance" into a soil.

(b) Imperfect Drainage

Brisbane Loam (2,400 acres)

Brisbane loam is the imperfectly drained member of the Burford catena. It has developed on calcareous gravelly materials and usually occurs in level or slightly depressional areas which receive excess water from surrounding higher areas and where the water table is higher than that found under well drained locations. The profile weakly expresses the characteristics of the Grey-Brown Podzolic Great Soil Group. The following profile description is representative of the type.

A_1 – 0-5 inches; loam; very dark grey (10 YR 3/1); fine granular structure; very friable; cobbles; pH – 7.3.

A_2 – 5-10 inches; loam; grey-brown (10 YR 5/2); mottled; crumb and granular structure; friable; pH – 7.3.

B – 10-18 inches; loam; dark brown (10 YR 4/3); mottled; medium nuciform structure; hard when dry; pH – 7.3.

C – Light grey (10 YR 7/2); well sorted gravel; pH – 8.0.

The topography is level to slightly depressional and the natural vegetation is soft maple and elm.

Agriculture

Brisbane loam is inferior to its well drained associate Burford loam in its ability to grow a wide variety of crops. For certain crops it will be more influenced by seasonal variations in rainfall. In dry summers it should produce good crops of hay and spring grains, in wet summers its productivity will rate fairly low. It is not a reliable soil for alfalfa or fall wheat but with favourable climatic conditions it may produce a good crop of the latter. It should respond to tile drainage if suitable outlets are available.

(c) Poor Drainage

Gilford Loam (4,700 acres)

The Gilford loam is the poorly drained member of the Burford catena. It is developed on well sorted gravel in depressional areas having a high water table. The following profile description is representative of these soils.

A_1 – 0-6 inches; loam; black (10 YR 2/1); granular structure; very friable; pH – 7.0.

G – 6-11 inches; loam; grey-brown (2.5 YR 5/2); mottled; medium blocky structure; friable; many small stones; carbonates; pH – 7.2.

C – Sand and gravel; mottled grey-brown; calcareous.

The present day vegetation is elm, soft maple, cedar, balsam, etc.

Agriculture

The Gilford loam in Grey County is mostly woodlot or permanent pasture and it would seem to be serving its most useful economic function as such. Without artificial drainage it is unsuitable for the growth of most farm crops and in most cases it is not practical to attempt installation of tile drains. Ditch drainage would make it a better medium for either permanent pasture or for carrying the more valuable species of trees.

B. COARSE SANDY MATERIALS

The soils developed on the outwash sand plains in Grey County have been mapped as the Brighton, Sullivan and Fox catenas.

(a) Good Drainage

Brighton Sand (10,400 acres)

The Brighton sand is developed on well sorted high lime sands. This series is the well drained member of the Brighton catena. Tecumseth is the imperfectly drained member while Granby is the poorly drained member. The first two members of the catena are considered to belong to the Grey-Brown Podzolic Great Soil Group. In Grey County many of the apple orchards in the Meaford and Thornbury areas are located on this soil type.

Profile (cultivated)

Ac – 0-7 inches; sand; greyish brown; weak crumb structure; pH – 6.5.

A_2 – 7-12 inches; sand; light brownish grey; single grain structure; pH – 6.5.

B_2 – 12-15 inches; sand; light reddish brown; slightly cemented; pH – 6.8.

B_3 – 15-25 inches; sand; light reddish brown; loose single grain; pH – 7.0.

C – Grey calcareous sand.

There is some variation in depth of solum. The B horizon is barely distinguishable in places. The topography varies from smooth level to smooth very gently sloping. It is essentially stonefree.

Fox Sandy Loam (1,200 acres)

Fox sandy loam is developed on well sorted calcareous sandy outwash materials. It is the well drained member of the Fox catena. The profile exhibits the characteristics associated with the Grey-Brown Podzolic Great Soil Group. Other catenary members are the imperfectly drained Brady and the poorly drained Granby. It is mapped in small acreages in the southern part of the County. The profile exhibits the following characteristics.

A_1 – 0-3 inches; sandy loam; very dark grey (10 YR 3/1); fine crumb structure; very friable; pH – 6.5.

A_2 – 3-23 inches; sand; yellowish brown (10 YR 5/4); single grain structure; loose consistency; stonefree; pH – 6.4.

B_2 – 23-27 inches; loam; dark brown (10 YR 4/3); medium to fine nuciform structure; friable; pH – 7.0.

C – Calcareous medium sand: light grey (10 YR 7/2); pH – 7.8.

The topography is usually undulating. Although surface run-off is low, the internal drainage tends to be excessive. The natural vegetation is the maple, beech association.

Agriculture

Although this soil is of low natural fertility, under enlightened farm management practices a fairly wide range of crops can be successfully grown. It will produce fair to good yields of crops normally grown in the area and is a good potato soil. Most important of soil management practices on the Fox sandy loam are those designed to increase fertility and the moisture holding capacity. Such measures include the use of barnyard manure and commercial fertilizers. If relatively large quantities of barnyard manure are not available the organic matter content should be augmented by the use of green manuring crops such as fall rye, sweet clover, etc.

Sullivan Sand (7,400 acres)

The Sullivan sand mapped in Grey County is a well drained soil developed on high lime sandy materials. The profile displays the characteristics of the Brown Forest Soils.

A_0 – ½-0 inches; decomposing leaf litter.

A_1 – 0-3 inches; sandy loam; dark grey (2.5 YR 4/0); fine crumb structure; carbonates at surface; pH – 7.4.

B – 3-7 inches; sandy loam; dark brown (10 YR 4/3); single grain; loose consistency; pH – 7.4.

C – Medium to coarse calcareous sand; grey (10 YR 6/1).

There is a range in depth of the B horizon. A B_1 horizon as deep as 10 inches may be present over a B_2 horizon of one to two inches. The topography varies from smooth gently sloping to irregular gently sloping. This series is essentially stonefree. The natural vegetation is the maple, beech association.

SULLIVAN SAND

Note the absence of a well defined leached horizon and the variability in depth of solum.

Agriculture

Successful farming on this series requires more care in farm management than for many of the other soil series. The low inherent fertility must be increased. The level of organic matter must be maintained or increased by the incorporation of green manuring crops, strawy manure and crop residues.

Fair hay crops such as clover and alfalfa are grown, and fall wheat, oats and rye may be grown. Potatoes should do well on this soil.

Tioga Sandy Loam (1,000 acres)

A deposition of sandy materials protrudes into Grey County at Hepworth occupying approximately 1,000 acres. This well drained soil was mapped as the Tioga series. Numerous blow-out spots occur in the area. The following is a description of a virgin profile exposed in a woodlot.

A_1 – 0-1 inch; sandy loam; dark greyish brown (10 YR 4/2); very weak crumb or granular structure; pH – 6.0.

A_2p – 1-3 inches; sand; light grey (10 YR 7/2); single grain; loose; pH – 5.5.

Bp – 3-8 inches; sand; dark yellowish brown (10 YR 4/4); weak granular structure; pH – 7.2.

A_2GBP – 8-12 inches; sand; light yellow-brown (10 YR 6/4); single grain structure with some crumb structure; pH – 7.3.

B_2GBP – 12-15 inches; sand; brown (10 YR 5/3); weak crumb structure; pH – 7.4.

C – Sand; light grey; calcareous.

The double profile is a characteristic of this series under virgin conditions but disappears with cultivation. A small acreage of Aoelian material is included with this series. These are small sand dunes with accompanying blow-out spots. The topography varies from very gently sloping to gently sloping and in small areas where dunes are present should be rated irregular moderately sloping. It is essentially stonefree. The natural vegetation appears to be maple, beech.

Agriculture

Most of this area is out of cultivation and in permanent pasture. The ease with which this material will blow presents a serious problem to the farmer and has resulted in discouraging most farmers from attempting further cultivation.

(b) Imperfect Drainage

Tecumseth Sand (2,500 acres)

The Tecumseth series is the imperfectly drained member of the Brighton catena and as such is developed on high lime sandy materials. The profile exhibits the characteristics of the Grey-Brown Podzolic Soils.

Profile (cultivated)

A_1 – 0-4 inches; sand; grey-brown (10 YR 5/2) ; granular structure; very friable; pH – 7.0.

A_2 – 4-8 inches; sand; yellowish brown (10 YR 5/6); single grain structure; mottling; pH – 7.0.

B – 8-12 inches; sand; yellowish red (5 YR 4/6); slightly cemented; readily becoming single grain on rupture; pH – 7.2.

C – Mottled; grey calcareous sand.

Variations in depth of surface and solum occur. The topography is usually smooth very gently sloping. It is essentially stonefree. The natural vegetation appears to be soft maple and elm.

Agriculture

Fruit growers have not made much use of this series as an orchard soil. A few orchards have been planted on the Tecumseth soil and such trees appear to be producing fairly well. With improved drainage, the Tecumseth should make a very desirable orchard soil.

Most of the series is used for general farming and produces good crops of clover hay, and fair to good crops of spring grains and corn.

The sandy materials are low in fertility and require regular application of manure and fertilizers.

The series should respond to improved drainage but care must be taken that it is not excessively drained.

Brady Sandy Loam (2,300 acres)

Developed on well sorted calcareous sandy outwash materials, Brady sandy loam is the imperfectly drained member of the Fox catena. It is a weakly developed member of the Grey-Brown Podzolic Great Soil Group. It is mapped in Normanby and Bentinck townships and represents a small fraction of the soil in the County. The following profile description is representative of the type.

A_1 – 0-4 inches; sandy loam; very dark grey-brown (10 YR 3/2); crumb structure; very friable; pH – 6.8.

A_2 – 4-12 inches; sandy loam; yellowish brown (10 YR 5/6); mottling in lower part of horizon; single grain structure; pH – 6.5.

B – 12-15 inches; loam; dark brown (10 YR 4/3); mottled; fine nuciform structure; friable; pH – 7.0.

C – Calcareous sand; light grey (10 YR 7/2).

The topography is level to very slightly depressional. Surface run-off is nil and all the precipitation must find its way through the soil. For this reason excessive moisture conditions exist in the Brady solum in spring and fall.

Agriculture

Imperfect drainage and low natural fertility are the two main deterrents to good crop production on the Brady sandy loam. In its natural drainage condition it will produce fair crops of timothy, oats, rye and buckwheat. If drainage is improved it should grow as wide a range of crops with similar yields as the well drained Fox sandy loam. However, it is questionable whether it would be wise to drain such soils unless some specialized type of crop is to be grown.

(c) ***Poor Drainage***

Granby Sand (3,500 acres)

Granby sand is developed on calcareous well sorted sandy outwash materials. It is mapped as the poorly drained member of the Fox, Brighton and Sullivan catenas and exhibits the characteristics of the Dark Grey Gleisolic Great Soil Group. It is mapped in small scattered areas throughout the County. The following is a profile description of Granby sand.

Ac – 0-8 inches; sand; very dark grey (10 YR 3/1); fine crumb structure; pH – 7.0.

G – 8-20 inches; sand; light brownish grey (10 YR 6/2); severely mottled; single grain structure; free carbonates; pH – 7.4.

C – Grey calcareous sand.

The topography is level to depressional and the water table is close to the surface for the greater part of the year. Vegetation includes elm, cedar, soft maple, hemlock, birch and ash.

PROFILE OF GRANBY SAND

Note deep A_1 horizon and drab grey colouring of underlying horizons.

Agriculture

Most of the Granby sand is at present woodlot or permanent pasture. Due to poor drainage and low fertility the soil is not well suited for the production of most farm crops. In most pastures the herbage is of poor quality. Tile drains are likely to be too expensive a proposition for this soil type, but where outlets are available the drainage can be greatly improved by open ditches. It would seem that Granby sand is serving its most useful function as woodlot or permanent pasture and its performances in such a capacity could be enhanced by improving drainage with open ditches.

BREYPEN LAND TYPE

There are thousands of acres of this land type in the northern parts of Grey and Bruce Counties.

V. SOILS DEVELOPED FROM SHALLOW DRIFT OVER LIMESTONE BEDROCK

The soils developed on these shallow soils over limestone bedrock are mapped as Breypen Land type and Farmington loam.

Variable Drainage

Breypen Land Type (41,900 acres)

The soil mantle overlying the limestone bedrock is quite shallow in Keppel Township and parts of Sydenham east of Owen Sound. The surface of the bedrock is very rough and knobby with pockets of soil between the knobs. Numerous limestone bluffs occur throughout the area. The topography is variable ranging from undulating to steeply hilly.

This land type supports a good tree cover of hardwoods, the trees obtaining fair depth of rooting in the numerous large fissures in the rock. The deforested areas are used for grazing and for this purpose are only fair as the carrying capacity for livestock is low.

The reforestation of these areas would not be easily accomplished since the job would have to be done either by natural seeding or planting by hand.

Farmington Loam (2,100 acres)

The small acreage of Farmington loam has developed on less than a foot of glacial drift over limestone bedrock.

The soil is too shallow for cultivation and is used for permanent pasture.

VI. SOILS DEVELOPED ON ORGANIC MATERIALS

The accumulation of organic materials in low lying areas results in the establishment of bog soils. In such areas the accumulation of organic materials exceeds a foot in depth.

Fairly large acreages of bog occur in all the townships in Grey County. They consist of the accumulation of organic materials in various stages of decomposition.

Very Poor Drainage

Muck (98,900 acres)

The following is a description of the various layers usually found in a muck deposit.

0-12" Surface—black well decomposed organic materials, derived from leaves, sedges, etc. pH – 7.0.

12-30" decomposed organic materials with a fair percentage of woody residues from fallen trees.

Clay, till sand or bedrock.

Muck soils occur on depressional locations. The drainage is very poor and the muck land is usually saturated with water for a large part of the year. The vegetation consists of elm, ash, white cedar, tamarack and sedges. The reaction varies from neutral to slightly alkaline and is influenced by dissolved calcium rising with the ground water.

Agriculture

The muck soils have not been developed for agriculture in Grey County. They are mostly under tree cover and a considerable number of hydro poles, fence posts, fuel wood, etc., are cut annually. The muck may be used as a source of organic matter particularly for use on the low fertility sandy soils.

Peat (500 acres)

The peat deposits in the County are relatively small and unimportant. Some peat occurs in association with muck soils in areas too small to be delineated at the scale of mapping used in this survey. The peat has developed from mosses,

cattails, and tamarack. Tree growth is more scanty and scrubby than on muck soils, in many cases consisting of only tamarack and stunted black spruce. Peat contains large quantities of only partially decomposed materials, is woody in nature, and brownish in colour. Peat bogs occur on depressional areas and the drainage is very poor.

Agriculture

The peat bogs have not been developed for agriculture in this County. They represent a small acreage and their only value at present is serving as reservoirs for water and shelter for wild life.

VII. SOILS DEVELOPED FROM ALLUVIAL MATERIAL ALONG STREAM COURSES

Bottom Land (40,400 acres)

The low lying soils along the stream courses which are subject to periodical flooding are mapped as Bottom Land.

These are alluvial soils characterized by a dark coloured surface and glei subsoil. The drainage is usually poor and vegetation consists of willow, elm and cedar. In some places where the Bottom Land is flooded for a large part of the season sedges and marsh grasses are common. The Bottom Land is used largely as pasture land.

Marsh (400 acres)

Those areas mapped as marsh are shallow ponded and under water most of the year. Vegetation consists of cattails, reeds, and other water loving plants.

Marl (1,600 acres)

Two drained lake bottoms were mapped as Marl in Keppel township. This lime deposition varies from two to over three feet in depth and is underlain by clay.

PART IV

AGRICULTURE AND LAND USE

Early Settlement and Agricultural Development

The first farmers in Grey County of whom there is any record were Indians. They grew corn and other cereals. The first white settlers in the County came by water and settled in St. Vincent township in 1833. About this time Charles Rankin settled at what is now Thornbury, cleared land and grew three hundred bushels of potatoes the first year. By 1881 all the land had been taken up in eight of the 18 townships and in the remainder, 82 per cent had been occupied.

In 1881, according to the Ontario Agricultural Commission, there were three cheese factories, one creamery, a woollen factory and nine saw mills as well as grist and flour mills. Fall and spring wheat, barley, oats, peas, potatoes, turnips and large quantities of hay were the main crops grown at that time. Large numbers of cattle, sheep and hogs were kept. Even at this early date the fruit growing potentialities of the Georgian Bay area had been recognized and peaches, pears, plums and winter apples are reported as being grown extensively.

Very little drainage improvement was achieved in the early days and small quantities of salt and plaster were used on cereal grains and grasses as fertilizer supplements.

Present Agriculture

Grey County has remained basically a beef farming county although milk products form an important supplement to the farm income. Grade cattle of the dual-purpose Shorthorn type are popular. Most of the cream is processed in the County but some finds its way to Toronto. Since 1941 a small amount of cheese has been produced and the only other whole milk outlet is that sold to the urban centres in the County.

It is quite possible that the demand for fluid milk from the Toronto market may bring about an important increase in dairying in the County. The good highways and nearness to the Toronto market are factors favouring such a development.

Important supplementary income for most farmers is derived from poultry products, sheep and hogs. In some areas, especially on the finer well drained soils, specialization in grain and seed production has increased. Oats, barley, flax, rape seed, alfalfa, and ladino clover are some of the seed crops grown.

The fruit growing industry in the Georgian Bay area has become one of first importance. Apples, plums, pears and cherries are grown. There is also a considerable acreage of small fruits and vegetables.

The Agricultural Representative's Branch located in Markdale has been very active in organizing agricultural projects in the County, and has been a factor in the agricultural development and growth of the area.

Tables 5 and 6 taken from the 1941 census indicate the present status of land use in Grey County.

TABLE 5

PRESENT LAND USE

	Acres	Per Cent of Total
Total Land Area	1,093,120	
Area occupied land	1,053,262	96
Area improved land	614,835	56
Area unimproved land	438,427	40
Woodland	179,277	16

The four per cent representing unoccupied land is made up of road allowances, crown land and large swamps. According to the above figures 56 per cent of the occupied land is improved.

TABLE 6

PRESENT USE OF IMPROVED LAND

	Acres
Area of Improved Land	614,835
Field Crops	406,657
Market garden	164
Orchard	2,865
Small fruits	85
Fallow	18,867
Pasture	162,934
Other	23,263

Field crops and improved pasture represent 92 per cent of the improved land and of this there is three times as much land in field crops as pasture.

The acreage in field crops given in Table 7 is taken from the Annual Report of the Statistics Branch (1948) Ontario Department of Agriculture.

TABLE 7

ACREAGE OF FIELD CROPS IN GREY COUNTY

(Annual Report of Statistics Branch, 1948, Ontario Department of Agriculture)

Crops	Acres	
Hay and Clover	149,800	
Alfalfa	49,200	199,000
Oats	92,200	
Mixed grain	77,800	
Buckwheat	1,900	
Barley	17,900	
Wheat	25,810	
Rye	1,270	216,880
Ensilage corn	9,500	
Potatoes	4,030	
Beans	140	
Soybeans	20	
Mangels	1,290	
Turnips	860	
Peas	590	
Flax	10,500	26,930
Total Field Crops		442,810
Seeded pasture	133,600	

A glance at table 8 provides an overall panoramic picture of the agriculture of Grey County. The large acreage of hay and clover, oats and mixed grain confirm the statement that Grey County is essentially a live-stock raising county. The small acreage of high value cash crops is largely a reflection of unsuitable climatic environment. The acreage of buckwheat is also small especially in a county where a large acreage of inadequately drained soils exists. It must be assumed that large acreages of such soils are kept in permanent pasture rather than being brought into cultivation.

The unimproved land of the County comprises slightly over 40 per cent of the total land. Table 8 from the 1941 census shows the proportion of unimproved land in pasture, woodland and marsh.

TABLE 8

PRESENT USE OF UNIMPROVED LAND

Natural pasture	210,127
Woodland	179,277
Marsh	49,023
TOTAL	438,427

Almost half of the unimproved land is in natural pasture. This includes many large cleared areas too hilly or stony for successful cultivation, many poorly drained areas and large areas in the northern part of the County where shallowness of the soil mantle results in numerous rock outcrops making cultivation impossible. The following table taken from the 1941 census gives an indication of the size of the fruit growing industry in the County.

TABLE 9

TYPE AND VALUE OF TREE FRUIT PRODUCTION

VARIETY OF TREES	NUMBER OF TREES	VALUE OF PRODUCTION
Apples	149,957	$125,796
Peaches	291	160
Pears	6,414	1,592
Plums	7,706	1,757
Cherries	6,554	1,729

Table 10 taken from the 1941 census provides more evidence of the types of farms in Grey County.

TABLE 10

TYPE OF FARM IN GREY COUNTY

Total number of farms	7,728
Grains and Hay	103
Potatoes, roots and other field crops	4
Vegetables, fruits and nursery crops	104
Dairy products	219
Poultry	56
Livestock	3,467
Forest and Apiary products	174
Subsistence and Combinations of Subsistence	1,431
Mixed farming	1,454
Part Time	151

The above classification is based on the source or sources of farm revenue. Mixed farms are farms where the revenue from two or more of the other main types of products were required to produce 50 per cent or more of the gross revenue. Subsistence farms are those on which the value of products consumed

or used by the farm household amounted to 50 per cent or more of the gross farm revenue. Combinations of subsistence farms are farms where the value of products used or consumed and the revenue from another main type such as poultry, livestock, etc., were required to form 50 per cent or more of the gross farm income.

Utilization and Management of Grey County Soils

In agricultural pursuits man has found that he has to adapt his land use programme to the soil. Physical characteristics such as texture, topography and depth to bedrock are factors which man does not attempt to change but over the years has developed a type of agriculture to fit the conditions as they exist. Other factors such as moisture holding capacity, stoniness, structure, fertility, etc., can be modified in order to increase the productivity of the soil. It is essential to have a knowledge of all these factors to maintain the soil in its best physical state, to obtain the maximum in crop production and to determine the land use best adapted to a given set of conditions.

Soil texture has long been recognized as a factor influencing utilization and management and in this section it is proposed to discuss utilization and management on a textural class basis, grouping the soils of the County into three classes: fine, medium and coarse textured soils.

GROUP I—FINE TEXTURED SOILS

Soil Type	Acreage	Total
(*a*) ***Well Drained***		
Vincent silty clay loam	61,300	
Vincent silty clay loam eroded	24,400	
Vincent silty clay loam bouldery	100	
Saugeen silty clay loam	2,200	
Dunedin clay loam	26,900	
Dunedin clay eroded	2,200	
Leith silty clay loam	4,300	
		121,400
(*b*) ***Imperfectly Drained***		
Kemble silty clay loam	15,900	
Elderslie silty clay loam	12,200	
		28,100
(*c*) ***Poorly Drained***		
Brookston clay loam	20,400	
Brookston clay loam bouldery	1,100	
Chesley silty clay loam	10,100	
Toledo clay loam	4,100	
Morley clay	4,500	
Morley clay bouldery	400	
		40,600

The soils discussed under this heading are Vincent, Leith, Kemble, Brookston, Dunedin, Morley, Saugeen, Elderslie, Chesley, and Toledo. The Saugeen series is slightly acid in reaction and application of lime may be beneficial to legume crops. The Dunedin and Morley are very slightly acid and the remainder are neutral to slightly alkaline.

The fine particles in clay soils retard the movement of air and water. Unless surface runoff is medium to high they are likely to become water-logged. Upon drying they shrink and cause considerable damage to root development of plants. These soils have a high water holding capacity, are sticky and plastic when wet and tend to form clods when dry making them difficult to work. Fine textured

soils respond slowly to temperature changes and are consequently late soils. The clay particles are responsible for supplying nutrients to plants and the high percentage of such particles in fine textured soils gives them a high level of natural fertility.

The Kemble, Elderslie, Brookston, Morley, Chesley and Toledo soils are limited in crop production by inadequate drainage. The first two mentioned are imperfectly drained, the remainder poorly drained. The internal movement of water is very slow on account of the impervious nature of the soil materials. Every possible means should be taken to remove surplus surface water. Tile drainage should be employed where necessary. Regular applications of organic matter will improve internal drainage if the water table is not too near the surface.

The Vincent and Dunedin series are very susceptible to erosion and on the steeper slopes erosion has been extensive. These areas should be seeded down and retired from cultivation. Control measures should be adapted to prevent further erosion in areas still under cultivation. Such measures include strip cropping and long rotations under grass.

The Morley series has undoubtedly the poorest structure of all the fine textured soils. Low organic matter and high clay content combined with the plasticity of the shaly materials are responsible for this condition.

When adequately drained the fine textured soils have a high productive capacity. They are capable of growing crops which are heavy feeders on plant nutrients. These include cereal grains, flax, etc. In this connection such soils are well adapted for the growing of registered seed grain. Clover and alfalfa grow well wherever drainage is favourable. With average management, yields of 35-40 bushels of fall wheat, 50-60 bushels of oats and 3-4 tons alfalfa per acre (2 cuts) should be realized on the well drained soils of this textural class.

GROUP II—COARSE TEXTURED SOILS

Soil Type	Acreage	Total
(*a*) ***Well Drained***		
Brighton sand	10,400	
Brighton sand over gravel	700	
Fox sandy loam	1,200	
Tioga sand	1,000	
Sullivan sand	7,400	
Brighton sandy loam	400	
Waterloo sandy loam	8,600	
Donnybrook sandy loam	31,600	
		61,300
(*b*) ***Imperfectly Drained***		
Tecumseth sandy loam	2,500	
Brady sandy loam	2,300	
		4,800
(*c*) ***Poorly Drained***		
Granby sand	3,500	
		3,500

There is a considerable acreage of sands and sandy loam soils in Grey County. This class of soils is represented by the Fox, Brady, Granby, Brighton, Tecumseth, Sullivan, Donnybrook, Waterloo, and Tioga series. They are developed on medium to highly calcareous sandy materials. The Fox, Waterloo and Tioga are the more acid soils classed in the slight to medium acid range. Lime loving crops such as the legumes should respond to applications of lime on these soils.

The coarseness of the particles allows easy movement of water through the soil and creates a problem of retaining sufficient water in the soil for plant requirements. This factor is largely conditioned by the supply of organic matter and the position of the water table in the soil.

Excessive moisture conditions are present only in those soils where the water table is high as in the Brady, Granby and Tecumseth series. When improving the drainage of such soils it is important not to lower the water table any farther than is necessary. Once drained the chief factor in moisture retention is organic matter. Poorly drained sandy soils are usually well supplied with organic matter but when they are drained and under cultivation the organic matter is rapidly depleted unless precautions are taken to replace it.

In clay soils cohesion between the particles can reach proportions that become undesirable but in sandy soils everything possible should be done to encourage cohesion. This is essential to discourage drifting and retard the internal movement of water. The best known corrective measure is the use of organic matter which binds the sand particles together. Poorly drained sandy soils usually have such desirable structure because they are well supplied with organic matter.

Green manuring crops are recommended to supplement applications of barnyard manure on these light textured soils. The application of artificial fertilizers with a fairly high nitrogen formula is recommended for most farm crops. Under average management, 20 bushels of fall wheat, 30-35 bushels of oats, and 2 tons hay per acre should be realized on the well drained members of this group of soils with the exception of the Waterloo and Donnybrook soils.

Sandy soils are best employed for specialized forms of agriculture, large and small fruits, potatoes, tomatoes, etc., wherever environmental climatic factors are favourable.

GROUP III—MEDIUM TEXTURED SOILS

Soil Type	Acreage	Total
(*a*) ***Well Drained***		
Harriston silt loam	96,400	
Harriston loam	35,400	
Harkaway silt loam	45,100	
Harkaway loam	49,700	
Harkaway loam bouldery phase	5,600	
Osprey loam	156,000	
Osprey loam bouldery phase	8,500	
Osprey sandy loam	300	
Pike Lake loam	900	
Burford loam	3,900	
Sargent loam	12,700	
		526,700
(*b*) ***Imperfectly Drained***		
Listowel silt loam	72,200	
Listowel loam	1,400	
Wiarton silt loam	10,000	
Wiarton loam	2,300	
Brisbane loam	2,400	
		88,300
(*c*) ***Poorly Drained***		
Parkhill loam	19,500	
Lily loam	7,900	
Gilford loam	4,700	
		32,100

Loam and silt loam soils occupy a large percentage of the soil area of the County. These may be divided into two groups: those which are very stony and those which are slightly stony to moderately stony. The latter are the Harriston, Listowel, Parkhill, Harkaway, Wiarton, Burford, Brisbane, Gilford and Sargent series. The very stony group consists of the Osprey and Pike Lake. The Osprey and Pike Lake are not only very stony but are hilly as well, thus limiting their value as agricultural soils. The Lily is lacking in drainage in addition to being a stony soil.

These soils have properties intermediate between the clays and the sands. Movement of water through the soil is good and yet they have a greater moisture holding capacity than the sands. The natural fertility level is midway between the clay and sandy soils. The cost of maintaining the fertility of these soils is higher than in the clays but this is counter-balanced by more economical cultivation. It requires more power and labour to prepare a seed bed on a heavy clay soil than on a loam or silt loam. This group with the exception of the inadequately drained members is adapted to a wider range of farm crops than either of the other groups.

The well drained soils of this group are susceptible to water erosion and this is particularly true of the Harkaway, Harriston, Osprey and Pike Lake series. Lime is not required on any of the members of this group but beneficial results are obtained when phosphorus and potash are applied. Grain crops should also show response to nitrogen. Under average management, yields of 35-40 bushels of fall wheat, 50-60 bushels of oats and 3-4 tons of mixed hay should be expected from the well drained members with the exception of the Osprey and Pike Lake which are stony and hilly soils.

The organic matter content of these soils is important to crop production. Its level should be maintained by applications of barnyard manure and by plowing in of all trash cover.

GROUP IV—ACREAGE OF SHALLOW SOILS UNDERLAIN BY BEDROCK

Soil Type	Acreage	Total
Breypen land type	41,900	
Farmington loam	2,100	
		44,000

Slightly more than 4 per cent of the soils of Grey County have a soil mantle of less than one foot over bedrock. The characteristics and use of these soils have been dicussed in Part III.

They are for the most part used for pasture or woodland.

ORGANIC SOILS AND OTHER FLOOD LANDS

The organic soils occupy 141,800 acres in Grey County. They have not been developed for agricultural purposes but remain for the most part wooded and as such they appear to be serving their most useful purpose.

GROUP V—ACREAGE OF ORGANIC AND OTHER FLOOD LAND SOILS

Soil Type	Acreage	Total
Muck	98,900	
Peat	500	
Marl	1,600	
Bottom land	40,400	
Marsh	400	
		141,800

Bottom land is good pasture land. It not only produces good succulent herbage but plenty of water from adjacent streams is usually available throughout the summer.

Crop Adaptability Rating for Grey County Soils

In this section of the report an attempt has been made to arrange the soil types of Grey County into classes according to their ability to produce the crops commonly grown in the area. There are a number of ways in which this can be done and perhaps the best method would be to collect yield data on all crops for each soil type. However, such a task would represent a major survey in itself and is beyond the scope of the soil survey.

As a statistical method for rating these soils is lacking it has been necessary to base the rating for each type largely on assumed potential capacities. They are judged on physical and chemical characteristics which include basic fertility, structure, drainage, etc., and also external factors such as erosion susceptibility which will influence the choice of crops grown on a soil.

Ratings so made are not infallible because the productivity of a soil will vary greatly with management. Management includes all those operations and materials that go into producing a crop. The ratings reported here are made for crops commonly grown in the area under average systems of management.

Climate is another important variable within the County and has not been considered in establishing these ratings. Unfortunately this results in a degree of inaccuracy when comparing soils in the northern part of the County with those in the southern part.

TABLE 11

CROP ADAPTABILITY RATINGS FOR GOOD CROP LAND

Soil Type	Wheat	Oats	Barley	Alfalfa	Red Clover	Alsike Clover	Timothy	Perm. Past.	Fodder Corn	Potatoes	Tree Fruits
Harriston silt loam, Harriston loam	G	G	G	G	G	G	G	G	G-F	G-F	.....
Vincent silty clay loam	G	G	G	G	G	G	G	G	F	P	G-F
Leith silty clay loam	G	G	G	G	G	G	G	G	F	P	G-F
Dunedin clay	G	G	G	G-F	G	G	G	G	F	P	G-F
Harkaway silt loam, Harkaway loam	G-F	G	G	G	G	G	G	G	F	F	.....
Saugeen silty clay loam	G-F	G	G	G	G	G	G	G	F	P	.....

TABLE 12

ACREAGES OF GOOD CROP LAND

Soil Type	Acreage	Percentage of Total	Limitations
Harriston silt loam	96,400	8.8	Low fertility, susceptibility to erosion.
Harriston loam	35,400	3.5	Low fertility, susceptibility to erosion.
Vincent silty clay loam	61,300	5.6	Susceptibility to erosion, low fertility.
Leith silty clay loam	4,300	0.4	Susceptibility to erosion, low fertility.
Dunedin clay	26,900	2.5	Susceptibility to erosion, low fertility.
Harkaway silt loam	45,100	4.1	Susceptibility to erosion, low fertility.
Harkaway loam	49,700	4.5	Susceptibility to erosion, low fertility.
Saugeen silty clay loam	2,200	0.2	Susceptibility to erosion, low fertility.
	314,500	28.9	

TABLE 13

CROP ADAPTABILITY RATINGS FOR GOOD TO FAIR CROP LAND

Soil Type	Wheat	Oats	Barley	Alfalfa	Red Clover	Alsike Clover	Timothy	Perm. Past.	Fodder Corn	Potatoes	Tree Fruits
Burford loam	G-F	G-F	G-F	G-F	F	F	F	G-F	G-F	G-F	
Listowel silt loam		G-F	F	F	G-F	G	G	G	G	F-P	
Sargent loam	F	F	F	G-F	G-F	G-F	G-F	G-F	G-F	F	
Kemble silty clay loam		G-F	F	F	G-F	G	G	G	G-F	P	
Elderslie silty clay loam	F	G-F	F	F	G-F	G	G	G	F	P	
Wiarton silt loam, Wiarton loam		G-F	F	F	G-F	G	G-F	G	F	F-P	

TABLE 14

ACREAGES OF GOOD TO FAIR CROP LAND

Soil Type	Acreage	Percentage of Total	Limitations
Burford loam	3,900	0.35	Low fertility, droughtiness.
Listowel silt loam	72,200	7.2	
Listowel loam	1,400	0.12	Imperfect drainage, low fertility.
Sargent loam	12,700	1.2	Imperfect drainage, low fertility.
Kemble silty clay loam	15,900	1.6	Low fertility, droughtiness.
Elderslie silty clay loam	12,200	1.2	Imperfect drainage.
Wiarton silt loam	10,000	0.9	Imperfect drainage.
Wiarton loam	2,300	0.2	Imperfect drainage, low fertility.
	130,600	12.8	Imperfect drainage, low fertility.

TABLE 15

CROP ADAPTABILITY RATINGS FOR FAIR CROP LAND

Soil Type	Winter Wheat	Oats	Barley	Alfalfa	Red Clover	Alsike Clover	Timothy	Perm. Past.	Fodder Corn	Potatoes	Tree Fruits
Harkaway loam—stony phase		G	F	G-F	G-F	G-F	G-F	G-F	F	F-P	
Brisbane loam		G-F	F	F-P	F	F	F	G-F	F	F	
Fox sandy loam	F	F	F-P	F	F	F	F	F	F-P	G	
Brighton sandy loam, Brighton sand, Brighton sand over gravel	F	F	P	F	F-P	F-P	F	F	F-P	G	G
Brookston clay loam	P	F	P	P	F	F	G-F	G-F	F-P	P	
Toledo clay loam	P	F	P	P	F	F	G-F	G-F	F-P	P	
Chesley silty clay loam	P	F	P	P	F	F	G-F	G-F	F-P	P	
Tecumseth sandy loam	P	F	P	P	F-P	F-P	F	F	F	F	F
Brady sandy loam	P	F	P	P	F-P	F-P	F	F	F	F	
Parkhill loam, Parkhill silt loam	P	F-P	P	P	F	F	F	G	F-P	P	

TABLE 16

ACREAGES OF FAIR CROP LAND

Soil Type	Acreage	Per Cent of Total	Limitations
Harkaway loam—stony phase	5,600	.56	Stoniness, susceptibility to erosion.
Brisbane loam	2,400	.20	Imperfect drainage.
Fox sandy loam	1,200	.11	Low fertility, low moisture holding capacity.
Brighton sandy loam	400	.03	Low fertility, low moisture holding capacity.
Brighton sand	10,400	9.5	Low fertility, low moisture holding capacity.
Brighton sand over gravel	700	.08	Low fertility, low moisture holding capacity.
Brookston clay loam	20,400	2.2	Poor drainage.
Toledo clay loam	4,100	.4	Poor drainage.
Chesley silty clay loam	10,100	0.9	Poor drainage.
Parkhill loam, Parkhill silt loam	19,500	1.9	Poor drainage.
	74,800	15.88	

TABLE 17

CROP ADAPTABILITY RATINGS FOR FAIR TO POOR CROP LAND

Soil Type	Wheat	Oats	Barley	Alfalfa	Red Clover	Alsike Clover	Timothy	Perm. Past.	Fodder Corn	Potatoes
Harkaway loam—shallow phase	F	F	F	F-P	F	F	F	G-F	F	F
Sullivan sand	P	F-P	P	F-P	F-P	F-P	F-P	F-P	P	G
Osprey loam	F-P	F-P	F-P	F-P	F-P	F-P	F-P	G-F	P	P
Tioga sandy loam	P	F-P	P	P	P	P	P	F-P	P	G
Pike Lake loam	F-P	F-P	P	F-P	F-P	F-P	F-P	F	P	P
Donnybrook sandy loam	F-P	F-P	P	F-P	F-P	F-P	F-P	F	P	P
Waterloo sandy loam	F-P	F-P	P	F-P	F-P	F-P	F-P	F	P	F-P

TABLE 18

ACREAGES OF FAIR TO POOR CROP LAND

Soil Type	Acreages	Per Cent of Total	Limitations
Harkaway loam—shallow phase	1,200	.11	Shallowness to bedrock, fertility.
Sullivan sand	7,400	.68	Low moisture holding capacity, low fertility.
Osprey loam	156,000	15.6	Stoniness, steep topography.
Tioga sandy loam	1,000	.09	Low fertility, low moisture holding capacity.
Pike Lake loam	111,900	11.2	Stoniness, steep topography, low moisture holding capacity, low fertility.
Donnybrook sandy loam	31,600	3.3	Stoniness, steep topography, low moisture holding capacity, low fertility.
Waterloo sandy loam	8,600	0.79	Fertility, steep topography, low moisture holding capacity.
	317,700	31.77	

TABLE 19

CROP ADAPTABILITY RATINGS FOR POOR CROP LAND

Soil Type	Wheat	Oats	Barley	Alfalfa	Red Clover	Alsike Clover	Timothy	Perm. Past.	Fodder Corn	Potatoes
Vincent silty clay—eroded phase	P	P	P	F-P	P	P	F-P	F	P	P
Granby sand	P	F-P	P	P	P	P	F-P	F	P	P
Gilford loam	P	P	P	P	P	P	P	F-P	P	P
Morley clay	P	P	P	P	P	P	F-P	F	P	P
Dunedin clay—eroded phase	P	P	P	P	P	P	P	F-P	P	P
Vincent silty clay loam—bouldery phase	P	P	P	P	P	P	P	P	P	P

TABLE 20

ACREAGES OF POOR CROP LAND

Soil Type	Acreage	Percentage of Total	Limitations
Vincent silty clay—eroded phase	24,400	2.4	Susceptibility to erosion.
Granby sand	3,500	.34	Poor drainage, low fertility.
Gilford loam	4,700	.43	Poor drainage.
Morley clay	4,500	.43	Poor drainage, poor structure.
Dunedin clay—eroded phase	2,200	.22	Susceptibility to erosion.
Vincent silty clay loam—bouldery phase	100	.009	Stoniness.
	39,400	3.80	

TABLE 21

CROP ADAPTABILITY RATINGS FOR SUBMARGINAL CROP LAND

Soil Type	Perm. Pasture
Bottom land	G-F
Farmington	F
Breypen land type	F-P
Muck	P
Peat	P
Marl	P
Marsh	P

TABLE 22

ACREAGES OF SUBMARGINAL CROP LAND

Soil Type	Acreages	Percentage of Total	Limitations
Bottom land	40,400	3.5	Periodic flooding.
Farmington	2,100	0.2	Nearness to bedrock.
Breypen land type	41,900	3.8	Nearness to bedrock.
Muck	98,900	9.0	Very poor drainage, low fertility.
Peat	500	0.045	Very poor drainage, low fertility.
Marl	1,600	0.16	Very poor drainage, low fertility.
Marsh	400	0.036	Very poor drainage, low fertility.
	185,800	16.7	

PART V

DISCUSSION AND ANALYTICAL DATA

At the conclusion of the soil mapping in the County many surface soil samples were collected for chemical analysis. Wherever possible these samples were taken from unimproved permanent pastures to avoid variations due to management practices. The chemical data given in Table 23 are average values. It will be noted that chemical data have not been included for some soil series. The samples for the unreported series were too few in number and too scattered in pattern to provide any trend indications.

Reaction

It will be noted in the table that all the soils reported therein with the exception of the Leith have a relatively high pH indicating adequate amounts of replaceable calcium. Eroded areas on the Leith will also have an alkaline reaction.

Organic Matter

Organic matter content of these samples is fairly high, reflecting the effect of long periods under grass (permanent pastures) and also in some cases the accumulation of organic matter on inadequately drained soils.

Phosphorus

The Lohse and Ruhnke method ($KHSO_4$ extraction) was used for determining phosphorus. These workers suggested that soils having less than 60 lbs. of phosphorus per acre by this method are deficient in available phosphorus. It is known that in high lime soils such as those of Grey County the method extracts considerable phosphorus held in a form not readily available to plants. Thus Grey County soils having 60 lbs. or less of phosphorus by the $KHSO_4$ method can be considered very deficient in available phosphorus and many of the soils which have 100 to 150 lbs. phosphorus per acre by this method may still be deficient in readily available phosphorus. The levels of readily available phosphorus for the soils of Grey County as shown in Table 23 can be considered to be generally low.

Potassium

If we accept a value of 100 to 150 lbs. K_2O per acre as minimum requirement for general farm crops it will be seen that the only agricultural soils meeting that requirement are the Dunedin, Kemble, Elderslie, Leith and Vincent series.

Heavy potash feeding crops such as potatoes, alfalfa, clovers, corn and barley should respond to potassic fertilizer on the medium and coarse textured soils.

Calcium

Table 23 indicates that all the soils in the County have a sufficient supply of exchangeable calcium.

Magnesium

Considering a minimum requirement of magnesium in soil to be 1,200 lbs. per acre the data indicates that the Brighton, Fox and Leith are at a marginal level.

TABLE 23

AVERAGE VALUES FOR CHEMICAL COMPOSITION OF SURFACE SAMPLES FROM GREY COUNTY

Series	No. of Samples	Reaction pH	Organic Matter %	Phosphorus Readily Soluble Lbs. P/AC.	Exchangeable Potassium Lbs. K/AC.	Exchangeable Calcium Lbs. Ca/AC.	Exchangeable Magnesium Lbs. Mg/AC.
Brighton	4	6.9	3.5	60	50	4000	600
Burford	6	7.0	5.0	43	55	5000	1300
Dunedin	4	7.1	5.8	200	150	9000	1000
Elderslie	4	6.8	5.9	178	99	7000	1200
Listowel	6	7.3	6.0	151	61	8000	1500
Morley	3	6.7	5.8	410	167	9000	1900
Osprey	9	7.4	6.0	86	79	6000	1800
Parkhill	5	7.3	7.5	358	56	12000	1400
Pike Lake	9	7.4	4.0	73	71	7000	1200
Sargent	3	7.3	6.0	140	48	8000	900
Fox	3	7.5	3.0	50	31	3800	1200
Gilford	3	7.5	4.0	273	28	10000	2000
Granby	3	7.6	6.0	180	29	10000	1000
Harriston	6	7.2	4.0	75	85	5000	1400
Harkaway	4	7.3	5.0	88	85	6000	1300
Kemble	6	7.2	6.8	302	138	9000	1500
Leith	3	5.8	4.0	120	100	4000	800
Lily	3	7.1	11.0	220	65	14500	2700
Tecumseth	3	7.3	7.5	150	44	8000	1000
Vincent	8	7.0	5.4	114	104	7800	1200
Waterloo	5	6.8	3.5	60	62	6000	1100

(a) The analyses were done by Mr. R. D. O'Brien.

(1) Lohse and Ruhnke's method of determining readily soluble phosphorus was employed. For discussion of this method see Lohse, H. W., Ruhnke, G. N. "Studies of Readily Soluble Phosphorus in Soils." Soil Science 35:6, 1933.

(2) Replaceable potassium, calcium and magnesium were determined by methods of Schollenberger and Simon. For discussion of these methods see Schollenberger, C. J. and Simon, R. A. "Determination of Exchange Capacity and Exchangeable Bases in Soil, Ammonium Acetate Method." Soil Science 59:1, 1945.

(3) Organic carbon was determined by the method of Wakeley. For discussion see Wakeley, A. "An examination of methods for determining organic carbon and nitrogen in soils." Jour. of the American Society of Agronomy 25: 598-609.

The organic matter content was derived by applying the factor 1.724 to the percent of carbon.

RP-1-90-1M
© Queen's Printer for Ontario, 1990
ISBN 0-7729-6619-2